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SEP 81 P E FRIEDENBERG, R E MELTON, M GRAY
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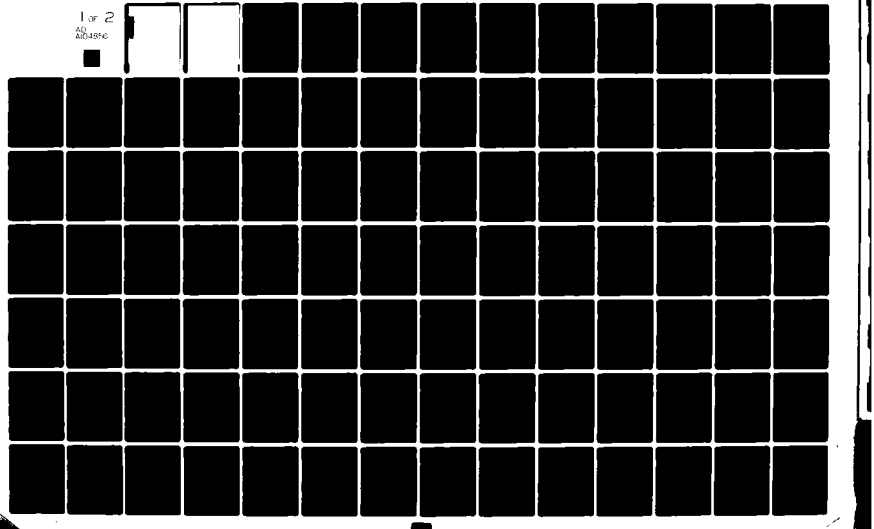

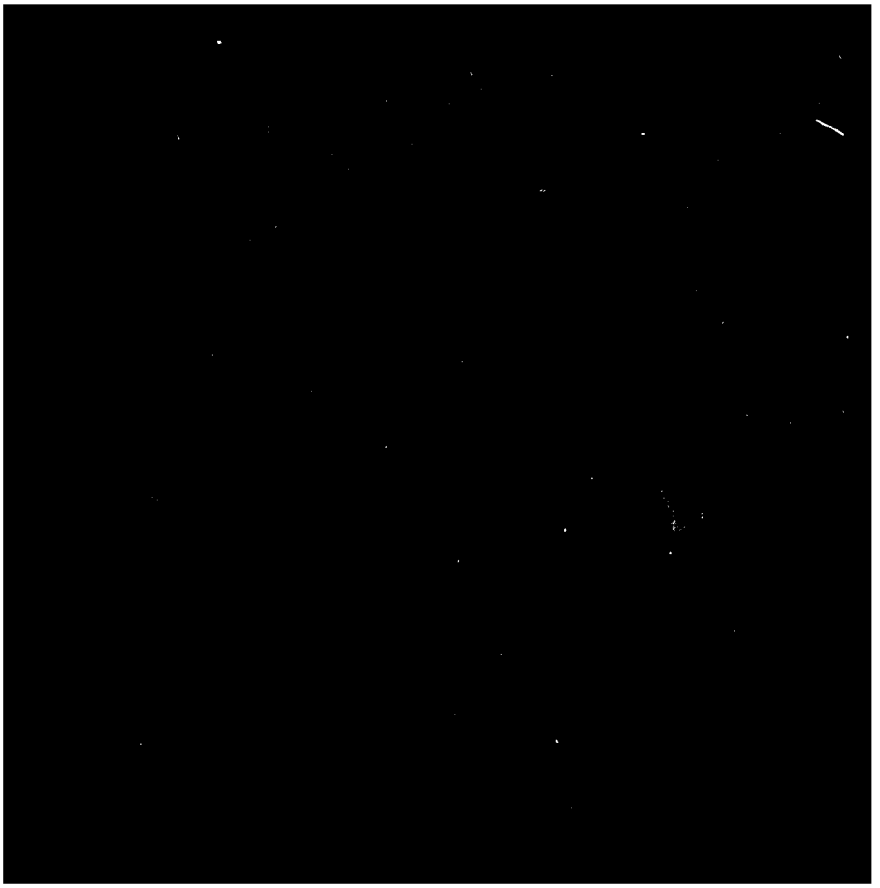

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TRADES simulates cargo shipment between ports for two modes of operation, commercial and military over-the-beach cargo movement.

This event-storing simulation, written in FORTRAN IV, accepts (as input data) ports, itineraries, cargo types and quantities, numbers of ship types, cargo transfer rates, and unit costs. The execution routines compute the time-distance-tonnage relationships for stated input data to establish cargo

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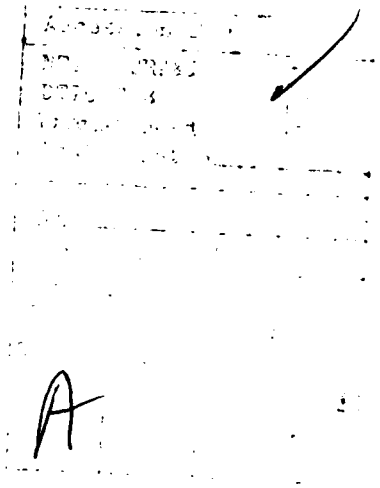
This report describes the model's logic elements and all the inputs needed by the TRADES model.



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ABSTRACT

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This event-storing simulation, written in FORTRAN IV, accepts (as input data) ports, itineraries, cargo types and quantities, numbers of ship types, cargo transfer rates, and unit costs. The execution routines compute the time-distance-tonnage relationships for stated input data to establish cargo loaded, transloaded, and off-loaded at each port; queue characteristics; utilization of ships; and system operating costs. The output can provide entire histographic summaries at specified simulation intervals in desired formats for information at port for the entire system.

This report describes the model's logic elements and all the inputs needed by the TRADES model.

ADMINISTRATIVE INFORMATION

The TRADES model was developed for use in the Merchant Shipping and Transfer Craft Requirements in Support of Amphibious Operations project, initiated by the Research and Technology Division of the Naval Supply Systems Command (NAVSUP 043). Technical guidance was provided by the Planning and Studies Division, Development Center, Marine Corps Development and Evaluation Command. The David W. Taylor Naval Ship Research and Development Center (DTNSRDC) undertook the project in FY 77. The Logistics Division (Code 187) of the Computation, Mathematics and Logistics Department was the performing organization.

INTRODUCTION

Current Department of Defense contingency military planning includes plans for amphibious operations involving the establishment of beachheads in overseas arenas. Once such a beachhead is established, U.S. Forces operating from the beachhead area, or Amphibious Operations Area (AOA), require continuing logistical support. Such support would be provided by the Military Sealift Command (MSC), utilizing ships directly under its command and merchant ships it has under contract which may be called into service when required under military contingencies as contractually specified.

The specific operational characteristics of the MSC fleet need to be defined as accurately as possible before its actual deployment. A digital computer simulation, TRADES, has been written for this purpose. Although TRADES can simulate all phases of cargo handling, including cargo generations, ship loading, overseas transport, ship unloading, ship-to-shore cargo transportation, and offloading of cargo at the beachhead, the emphasis is on the ship-to-shore phase of the operation.

BACKGROUND

At its start the project on Merchant Shipping and Transfer Craft Requirements for Support of Amphibious Operations used the Requirements Evaluated Against Cargo Transportation (REACT) model developed by Research Associates Incorporated for the Integrated Sealift Study. REACT simulates the movement of ships transporting cargo among a group of ports, and its use assumes that port facilities are available. However, it is possible that port facilities would be unavailable, necessitating the delivery of cargo over-the-beach. The ships would then have to be unloaded offshore and the cargo delivered ashore by transfer craft. The TRADES Model, developed for use in the Merchant Ship Project* to determine merchant ship and transfer craft force levels for various scenarios, was used to evaluate ship and transfer craft requirements by simulating their operations.

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*Gray, M., "Mechant Shipping and Transfer Craft Requirements in Support of Amphibious Operations," DTNSRDC Report 77-0039 (Apr 1977).

MODEL DESCRIPTION

SHIPS

This simulation accepts as input ports, number of ships and their types, cargo types and quantities, cargo transfer rates, and unit costs. The output can provide entire histographic summaries depicting shipping activities and cargo movement at specified simulation intervals in desired formats.

The basic role of a ship in the simulation is to carry cargo from ports of origin to destinations. Each ship in the simulation has two characteristics, its type (physical description), and its mode of operation (transport pattern). Ship types and transport patterns (i.e, itinerary or non-itinerary port schedules) determine ship utilization and cargo delivery.

Ship Types

A ship's type is defined by its physical characteristics, cargo preferences, and berthing requirements. The following characteristics determine a ship type:

- o Speed
- o Shipping capacity - weight and volume
- o Draft
- o Transfer systems
- o Berthing facility preference

The ship types considered by TRADES are roll-on/roll-off (RORO) ships, barges or lighter carriers (LASH ships), tanker ships, break bulk (BB) ships, and container ships.

Itinerary Ships

An itinerary ship is one assigned to a predetermined (set by input) port schedule, called an itinerary, which is an ordered list of ports. Itinerary ships service all ports on their itinerary in the order in which the ports appear. Because cargo does not control the operation of itinerary ships, it is possible for a ship to enter and leave a port on its itinerary without transferring any cargo.

EXAMPLE: A ship has an itinerary of ports A, B, C, and D. The ship starts its service cycle at port A and services port B, C, and D in that order. When the ship has completed service at the last port on the itinerary, port D, it returns to port A, and continues its service cycle.

Non-Itinerary Ships

A non-itinerary ship is one whose operation in the simulation is determined by the quantity of cargo to be moved and the space required to move that cargo. Non-itinerary ships enter a ship pool at their respective availability times. These ships leave the pool only when they are needed to move cargo and return to the pool when they are not needed. The ship pool is discussed later. The schedule of a non-itinerary ship is determined by the destination ports of the cargo the ship can carry.

EXAMPLE: A ship is servicing port A and is equipped to handle the following waiting cargo:

CARGO	COMMODITY TYPE	DESTINATION PORT
	1	B
	2	C
	3	D
	4	E

The following table shows the distances in nautical miles between ports A, B, C, D, and E. The quantities of cargo waiting at a port determine the schedule of a non-itinerary ship.

DISTANCE TABLE

	A	B	C	D	E
A	-	100	10	50	150
B	100	-	50	75	100
C	10	50	-	100	110
D	50	75	100	-	105
E	150	100	110	105	-

The ship will travel to the nearest port for which it has cargo. The port schedule of this non-itinerary ship is thus A to C (distance 10), C to B (50), B to D (75), D to E (105). If there is cargo waiting for shipment at ports B through E, TRADES will adjust the schedule accordingly.

Theater Operations

A theater is a group of ports to be considered as a unit. An intratheater ship loads cargo only for those ports which are in the same theater as the port generating the cargo. The ship then sails for the nearest port for which it has cargo. If it has no cargo aboard and there is any intratheater cargo at any other port in the same theater, the ship will sail to the nearest port with the largest amount of waiting cargo. If no port has intratheater cargo awaiting shipment, the ship joins the ship pool at its home port.

Ships assigned to intertheater operation load cargo generated in one theater for delivery to another theater. If its home and delivery theaters are the same, an intertheater ship can operate as an intratheater ship. Intertheater ships have the following operation options which are set by input:

- Load cargo in home theater for delivery in another theater and return to home theater for delivery in home theater
- Load cargo in home theater for delivery in home theater
- Load cargo in present theater for delivery in home theater.

Both intratheater and intertheater ships search for cargo to be loaded according to the following criteria:

- Is the cargo acceptable for this ship?
- Is the depth of the destination port compatible with the ship draft?
- Does the destination port have acceptable berthing and transfer facilities?

Both intratheater and intertheater ships must maintain a minimum utilization of volume and weight. If the current percentage of utilized volume and weight is less than a minimum percentage set by input and no other acceptable cargo will be available at that port for delivery within a specified time, the ship searches the other ports in its home/present theater for cargo destined for the delivery theater. If it finds an amount of acceptable cargo greater than or equal to an

amount specified by input, the ship sails for that port to load that cargo. If no such port is found, a check is made to determine whether the ship has cargo aboard. If there is no cargo aboard, the ship retires from operations and joins the ship pool at a port determined by input. If the ship has any cargo at all, it sails to the ports for which it has cargo. The closest port for which the ship has cargo is selected as the next port of call.

Ship Pool

Ships enter the pool for one of the following reasons:

- o Ships are initially placed in the pool at their availability times.
- o Ships which have been previously in normal operation enter the pool because no acceptable cargo is available for delivery.
- o Enough ships are already in service to transport the backlogged cargo. Ships entering the pool for this reason must remain in the pool for a period of time set by input.

When a ship is selected from the pool to resume operations, it is made available at its present port. If the first demand port is not the present port, the ship is available at the current time plus the travel time to the first service port.

PORTS

A port is simulated by this model in terms of berths and transfer systems. Both import and export ships at the port utilize these systems in their cargo movement. Each berth in the simulation is described by its type. The berth or facility type is defined by the general type(s) of ships, such as general freighter, non-sustaining container ship, etc., that can be accommodated at the berth. Additional descriptors for each type of facility define the transfer systems available at the facility to perform cargo operations required by the ship. The cargo handling rates reflect physical characteristics of the berths and material handling equipment.

Berth and Queue Operations

When a ship reaches a port, it must determine which type of facility to enter. Since preferred facility types are input, a check determines whether a first or second preference is available for the ship. If the first preference is available, the ship enters. If the first preference is occupied and a second preference is given and is available, the ship enters the second preference facility. If the first and second preferences are not available, the ship joins the queue (waiting line) to await service.

When a ship is in a queue, it is waiting for a specific type of facility in a particular port. If more than one ship in the queue is waiting for the same type of port facility, the ships are removed in the order in which they entered the queue. As facilities become available, each ship in the queue leaves the queue and enters the first available facility which can accommodate it. Each time a ship leaves a port, a check determines whether any other ship in the queue is waiting for the facility type just vacated. If such a ship is found, it leaves the queue and moves into the facility and its cargo transfer operations begin. The ship queue is updated each time a ship enters or leaves a port.

Over-the-Beach Operations

When a ship arrives in the AOA, its unloading is simulated. The time taken to unload the cargo is computed. The numbers of transfer craft and unloading facilities needed are added to the total numbers currently in use and subtracted from the total numbers still available for use by newly arriving ships. If the required craft and facilities are not available, the ship is put into a queue until such time as it can be accommodated.

As the ship is unloaded, its cargo is added to the total amount of cargo previously unloaded, by type, and the total amount of cargo of all types is also calculated. Loading and unloading operations for each ship type considered by TRADES are described in the following paragraphs.

Roll-on/Roll-off Ships.

Roll-on/Roll-off (Ro/Ro) ships carry wheeled vehicles. Only causeway ferries are required for unloading Ro/Ro ships. When the Ro/Ro ship arrives in the AOA, it begins unloading as soon as the causeway ferries are available. If causeway ferries are not immediately available, the Ro/Ro ship waits in a queue until they

are. Wheeled cargo rolls off the ship onto the causeway ferries, is transported to shore, and there rolls off the causeway ferries.

Barge or Lighter Carriers. Barge or lighter carriers (LASH ships) carry their cargo prepacked aboard barges which the ship discharges into the water using its own unloading equipment. After the barges have been lowered into the water, the ship is considered to be unloaded and the cargo delivered. Since the LASH ship unloads independently of any external facilities, it begins unloading immediately on arrival in the AOA and is never required to wait in a queue prior to unloading.

Tanker Ships. Tanker ships transport bulk POL (petroleum, oil and lubricants). In order to unload, they must be attached to a pipeline leading ashore. The POL is then pumped from the ship to a storage area on shore. If a pipeline is not available upon arrival of the tanker in the AOA, the tanker will be put into a queue until a pipeline is available.

Break Bulk Ships. If the ship is a break bulk (BB) ship, unloading begins only if the required ship-to-shore transfer craft (lighters or causeway ferries) and the required shoreside unloading facilities (forklifts) are available. If the required transfer craft and shoreside unloading facilities are not available, the ship is put into a queue until transfer craft and unloading facilities are available. Throughout the simulation, all transfer craft and facilities are made available to queued ships on a first-come, first-served basis.

Container ships. When a container ship arrives in the AOA, a check is made on the availability of support equipment needed to unload the ship and transport its cargo ashore. An unloading platform, normally consisting of a crane mounted aboard a barge, is required to move containers from the ship onto a transfer craft. The transfer craft may be either a lighter or a causeway ferry. As the transfer craft arrive at the shore, shoreside cranes unload the containers. Unloading of the container ship begins only when the unloading platform, ship-to-shore transfer craft, and shoreside cranes are available; otherwise, the container ship is placed in a queue until the needed equipment becomes available.

After the ship is completely unloaded, it departs for its next port, and the transfer craft and unloading facilities which it used are deleted from the lists of crafts and facilities currently in use.

CARGO

Cargo Generation

Cargo generation means that a certain type and quantity of cargo is made available at a specific time and at a specific port to be delivered to some other specified port. Cargo requirements refer to the quantity of cargo that must be carried from port of embarkation to port of debarkation. In general, the simulation moves generated cargo using the transportation resources available.

To generate cargo, the user must translate cargo items (household goods, munition, etc.) into cargo generation terminology which includes:

- Cargo type (e.g., ammunition, chill and freeze, general, vehicles, etc.)
- Time interval and amount of cargo to be generated at each interval
- Ports which generate cargo
- Ports to which cargo is to be delivered

Cargo is generated for delivery by an input time-phased schedule. The input factors which control the schedule and the amount of cargo for each generation include:

- Frequency of generation
- Time of initial generation
- Statistical distribution curve type which determines the quantity of cargo generated.

Cargo is generated at most once every simulation day.

Cargo Handling Rates

The rate at which cargo is loaded or discharged from a ship is a function of the type of berthing facility, the type of transfer system used, and the type of cargo being transferred. This rate is input for each combination allowed (maximum of six types of berthing facilities, six transfer systems, and eight cargo types).

In this simulation, provision is made for adjusting of transfer rates (base rates) by other factors which affect cargo handling. Even when all factors appear to be the same, ports may have different handling rates. The base rate is modified by the input factor associated with the port at which the ship is berthed. The loading and discharging operations are assumed to require the same amount of time for operations performed using the same berth type and transfer device type. After the correct rate has been determined for a given amount of cargo, the time required to complete cargo handling is computed as a function of that rate and the amount of cargo to be moved. This time represents only the time required to load/unload the cargo. The time required to move cargo between dock and holding area is not considered.

SIMULATION LOGIC

TRADES is an event storing simulation. Such a model is based on the sequential processing of a list of procedures, each of which occurs at a stated time. Such procedures are called events. Initial events are placed on the list (stored) at the beginning of the simulation, and they in turn store the same type of event or other events on the list.

EXAMPLE: The following initial events are placed on the list for processing:

- o Generate cargo at time = 1.00 day
- o Ship arrives at port at time = 1.50 days
- o Terminate run at time = 7.00 days

A Generate Cargo event is stored for each day of the simulation; the times at which the event will occur are thus 1.00, 2.00, 3.00, etc. Arrival of a ship at a port establishes the unloading and loading cycles and the selection of the next port of call. The following events are added to the event list:

TIME (Day)	EVENT LIST
1.50	Arrival at port (.50 to enter)
2.00	Unloading of ship (if one day to unload)
3.00	Loading of ship
5.50	Arrival at next port if 1.00 day for load + .50 day for transit to next port

Table 1 shows a complete event list and Figure 1, Logic Flowchart, shows the inter-relation of events and their storing sequence.

TABLE 1 - COMPLETE EVENT LIST

TIME (DAYS)	EVENT
1.00	Cargo generation
1.50	Arrival of ship
2.00	Cargo generation
2.00	Unloading cycle for this ship
3.00	Cargo generation
3.00	Loading cycle for this ship
4.00	Cargo generation
5.00	Cargo generation
5.50	Arrival of ship at next port of call
6.00	Cargo generation
6.00	Unloading cycle for this ship
7.00	End game

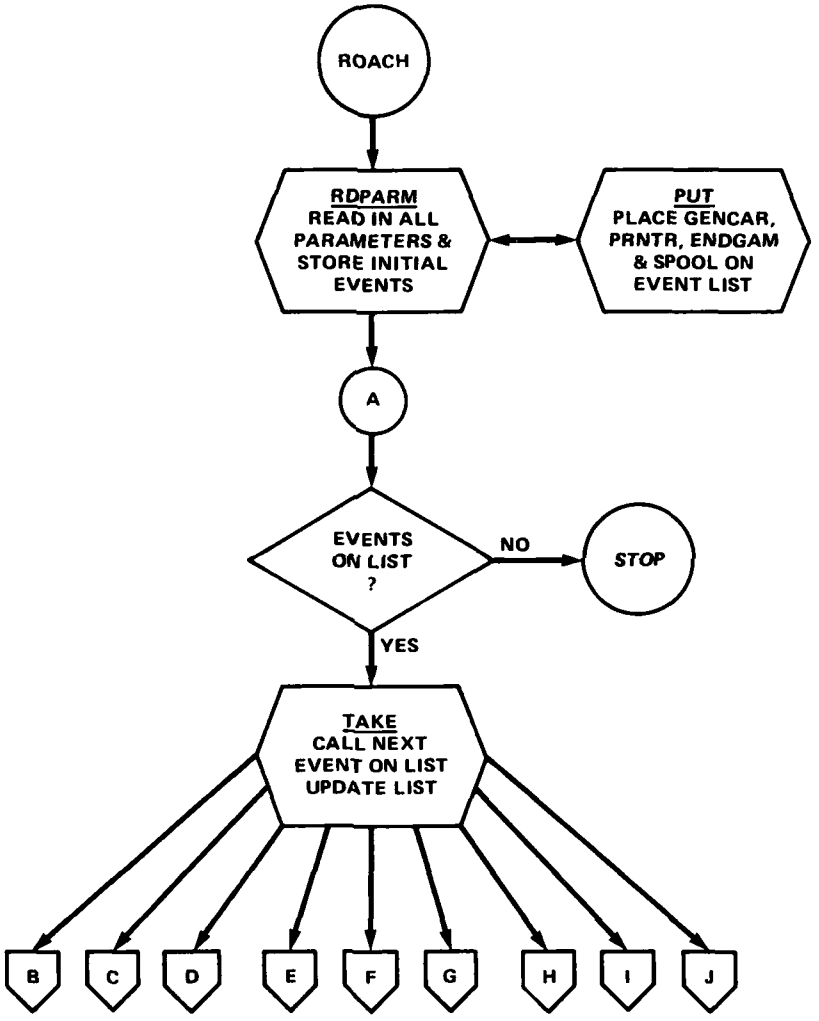
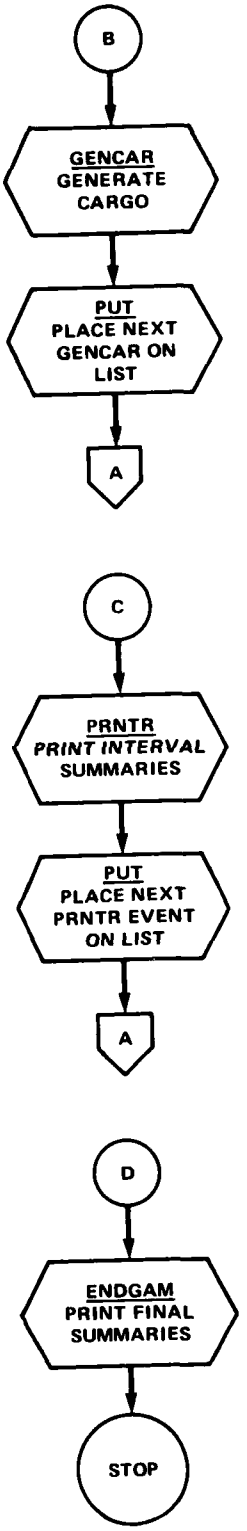
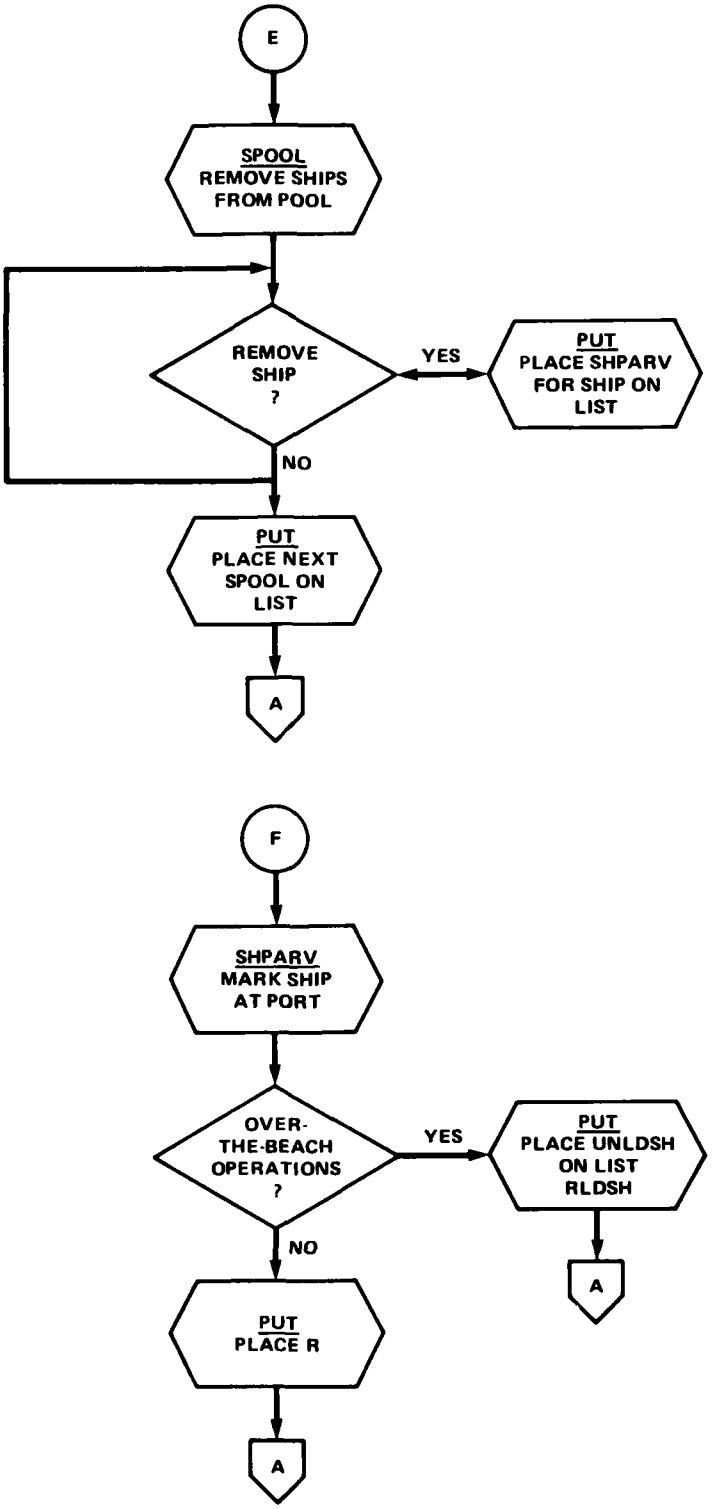
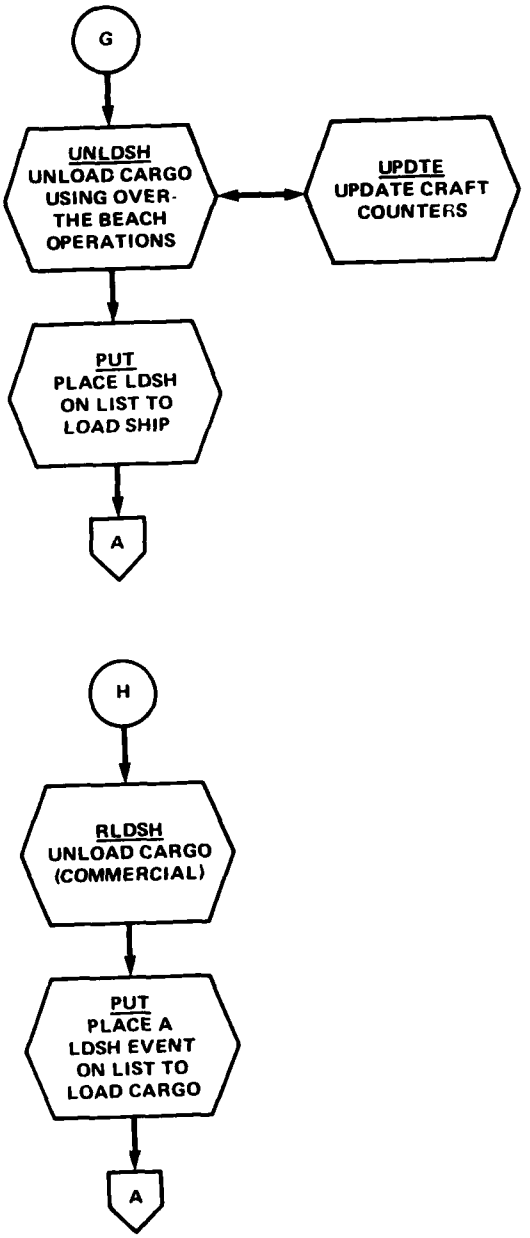
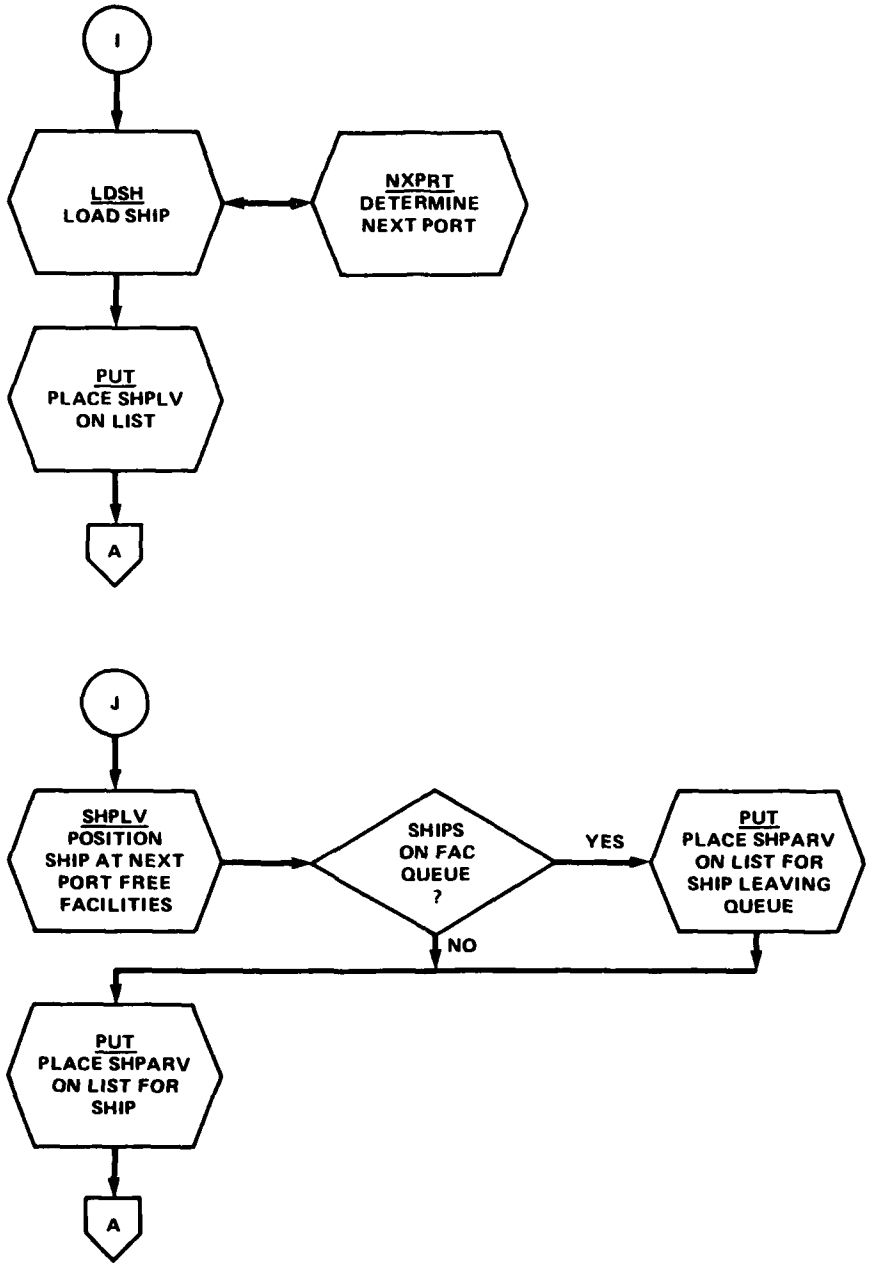


Figure 1 - Simulation Logic Flowchart


B
GENCAR
GENERATE
CARGO
PUT
PLACE NEXT
GENCAR ON
LIST
A
C
PRNTR
PRINT INTERVAL
SUMMARIES
PUT
PLACE NEXT
PRNTR EVENT
ON LIST
A
D
ENDGAM
PRINT FINAL
SUMMARIES
STOP


E
SPOOL
REMOVE SHIPS
FROM POOL
REMOVE
SHIP
?
YES
PUT
PLACE SHPARV
FOR SHIP ON
LIST
NO
PUT
PLACE NEXT
SPOOL ON
LIST
A
F
SHPARV
MARK SHIP
AT PORT
OVER-
THE-BEACH
OPERATIONS
?
YES
PUT
PLACE UNLDSH
ON LIST
RLDSH
A
NO
PUT
PLACE R
A


G
UNLDSH
UNLOAD CARGO USING OVER-THE BEACH OPERATIONS
UPDTE
UPDATE CRAFT COUNTERS
PUT
PLACE LDSH ON LIST TO LOAD SHIP
A
H
RLDSH
UNLOAD CARGO (COMMERCIAL)
PUT
PLACE A LDSH EVENT ON LIST TO LOAD CARGO
A


I
LDSH
LOAD SHIP
NXPRT
DETERMINE
NEXT PORT
PUT
PLACE SHPLV
ON LIST
A
J
SHPLV
POSITION
SHIP AT NEXT
PORT FREE
FACILITIES
SHIPS
ON FAC
QUEUE
?
YES
PUT
PLACE SHPARV
ON LIST FOR
SHIP LEAVING
QUEUE
NO
PUT
PLACE SHPARV
ON LIST FOR
SHIP
A

INPUT

This section describes the input necessary to run TRADES. Input parameters are grouped with respect to cargo, ship, and port descriptors.

Itinerary Card 1 (ITN1).

ITN1 indicates the numbers of itineraries to be used in the simulation. If ITN1 is blank, ITN2 cards are not used.

Variable	Columns	Format	Description
NITIN	1 - 3	I3	Number of itineraries in the simulation
KK	4 - 6	I3	If KK=1, only one iteration is made. If KK=7, the number of iterations is determined by SHTFLM

Itinerary Cards 2 (ITN2).

ITN2 gives the itineraries, i.e., lists of ports to be serviced in order of encounter. The maximum number of itineraries is 10, with a maximum of 10 ports per itinerary.

Variable	Columns	Format	Description
PORT1,...,PORT10	1 - 30	10I3	Ports to be serviced in given order

Run Identification Card (RDENT).

RDENT is a 72-column alphanumeric code describing the run.

General Information Card (GEN).

GEN gives the values of variables necessary to execute the simulation.

Variable	Columns	Format	Description
NSHIPS	1 - 9	I9	Number of ships (1 to 400)
NSTYP	10 - 18	I9	Number of ship types (1 to 30)
NNPORT	19 - 27	I9	Number of ports (1 to 30)
NFACT	28 - 36	I9	Number of facility types (1 to 6)
NTEA	37 - 45	I9	Number of theaters (1 to 6)
IOUT	46 - 54	I9	Printing option indicator IOUT $\leq$ 0, landing craft summaries = 1, landing craft summaries and logic diagnostics > 1, status and final summaries only
TINVL	55 - 60	F6.0	Simulation days between status summaries
ENDTIM	61 - 66	F6.0	Time to end simulation (days)

Cargo Generation Card 1 (CARG1).

CARG1 cards give the number of cargo generations to be read (1 to 1000).

Variable	Columns	Format	Description
NCARGN	1 - 10	I10	Number of cargo generations to be input (1 to 1000)

Cargo Generation Cards 2 (CARG2).

The CARG2 cards describe cargo entering the simulation, giving cargo type, origin and destination ports, and frequency of generation.

Variable	Columns	Format	Description
ENDDAY	1 - 3	I3	Final day of generation
STRDAY	4 - 5	I3	First day of generation
FREQ	7 - 8	I2	Days between generations
DISTRI	9	I1	Distribution curve type indicator =1, constant =2, uniform =3, normal
TYPE	10	I1	Cargo type
ORIG	11 - 12	I2	Origin port
DEST	13 - 14	I2	Destination port
PAR1 & PAR2	15 - 24	2I5	Parameters, used with distribution curve, DISTRI

Port Information Cards (PRT).

PRT cards give the physical characteristics of each port, as well as costing factors for ships using the facility. One card is input for each port.

Variable	Columns	Format	Description
FAC(I), I = 1,6	1 - 18	6I3	Number of berths of facility Type I
ITHR	19	I1	Theater
DELAY	20 - 25	F6.0	Delay time (days) in port
ADJPRT	26 - 31	F6.0	Port adjustment factor
CSTHL	32 - 37	F6.0	Handling cost ($/day) for each day ship is at the port
DRAFT	38 - 43	F6.0	Maximum draft (ft), determines largest ship allowed to berth at the port.

Variable	Columns	Format	Description
PRTNAM	44 - 55	A12	Port Name
IOVBCH	56	I1	= 1, port considered over-the-beach position and will involve over-the-beach operations. Otherwise, commercial operations are assumed.

Ship Type 1 CARDS (STYP1).

STYP1 cards give physical characteristics of classes of ships. These cards also input cost and delay factors associated with the vessel.

Variable	Columns	Format	Description
SPEED	1 - 8	F8.1	Speed (knots)
CAPACW	9 - 15	F8.2	Maximum load (long tons)
CAPACV	17 - 24	F8.3	Maximum volume (measurement tons)
CSTSEA	25 - 32	F8.4	Cost per day at sea ($/day)
CSTPRT	33 - 40	F8.5	Cost per day in port ($/day)
DRAFT	41 - 48	F8.6	Ship draft (ft)
ADJTRN	49 - 56	F8.7	Multi-transfer system interference factor
NTRNS1 - NTRNS6	57 - 64	6I1	Transfer system type indicators = 1, ship equipped with corresponding transfer system type
NTYP	65 - 66	I2	Total number of transfer system types aboard ship
CPRF1 - CPRF5	67 - 72	6I1	Cargo type that ship is able to carry (cargo type input by user)
FAC1	73	I1	First transfer facility type preference
FAC2	74	I1	Second transfer facility type preference

Variable	Columns	Format	Description
KCHNG	75	I1	Intertheater/intratheater operations indicator = 0, ship can change both origin and delivery theaters = 1, ship can change only delivery theater = 2, ship can change neither origin nor delivery theaters

Ship Type 2 Cards (STYP2).

STYP2 cards are continuations of the STYP1 cards. They give over-the-beach characteristics of the ship type.

Variable	Columns	Format	Description
NLDC	1 - 6	I4	Number of landing craft required (BB ship) or number of causeway ferries required (container ship or Ro/Ro)
NTRKS	7 - 12	I4	Number of trucks required (container ship)
NFKLS	13 - 18	I4	Number of forklifts required (BB ship) or number of shoreside cranes required (container ship)
STYP	19 - 24	I4	Ship operation type indicator = 1, Breakbulk 2, Container 3, Ro/Ro 4, LASH (barge or lighter carrier)
TTRNC	25 - 30	I4	Type of transfer craft
YNDV	31 - 36	I4	Shoreside unloading device indicator =1, Forklift 2, Crane

Ship Cards (SHP).

SHP cards give ship type information, location, and mission of each individual ship to be considered in the simulation.

Variable	Columns	Format	Description
TAV	1 - 3	I3	Time at which ship will be available (days)
IPRT	4 - 5	I2	Initial port at which ship will enter simulation
ITN	6 - 7	I2	Itinerary number, if ship is to follow an itinerary; otherwise, blank
OWR	9	I1	Operator of ship = 1, berth liner 2, long-term charter 3, friendly foreign
TYPE	10 - 11	I2	Ship type number
DTH	15	I1	Delivery theater
HOME	16 - 17	I2	Home port

Ship Card Modification Card 1 (MOD1).*

MOD1 gives the number of ship types to be modified.

Variable	Columns	Format	Description
NCT	1 - 3	I3	Number of ship types to be modified

If equal zero or blank, MOD2 and MOD4 are omitted.

Ship Cards Modification Card 2 (MOD2).

MOD2 cards give the ship types (1 to 30) to be modified.

Variable	Columns	Format	Description
NNTYPE(1) - NNTYPE(30)	1 - 60	30I2	Ship type number of ships to be modified

*The MOD cards allow the user to change the availability times for a specified ship type.

Ship Cards Modification Card 3 (MOD3).

MOD3 gives ship type availability times to be tested for entrance into the simulation. This option allows the modification of ship availability times by ship type. The ship availability time (TAV) given on the ship cards SHP is changed by the parameters given on the Ship Cards Modification Card 4.

Variable	Columns	Format	Description
NNAVAIL	1 - 3	I3	Availability time (days) to test for above ship types

Ship Cards Modification Card 4 (MOD4).

MOD4 gives the number of days to be subtracted from the ship's availability time if it is less than or equal to NNAVAIL given on MOD3.

Variable	Columns	Format	Description
NNNA	1 - 3	I3	Number of days by which availability time is to be decreased

Initial Supply (INSUP).

INSUP gives the amount of each type of cargo (days of supply) initially carried ashore by the assault follow-on echelon.

Variable	Columns	Format	Description
XIS(I)	1 - 10	F10.0	Amount of type I cargo (measurement tons) initially carried ashore by the assault follow-on echelon. I = 1, 6

Craft and Facility Card 1 (CF1).

CF1 gives the number of ship-to-shore transfer craft, the number of shoreside unloading facilities available to unload the transfer craft, and an option for receiving buildup ashore data on punched cards as program output. See Over-the-Beach Operations, page 7.

Variable	Columns	Format	Description
NTCFT	1 - 5	15	Number of types of transfer craft available
NSUFAC	6 - 10	15	Number of types of shoreside unloading facilities available
KPNCH	11 - 15		KPNCH = 1, punch output data; otherwise, no punched output

Punch Identification Card (PNCHID).

PNCHID gives the identifying information to be punched onto cards containing the buildup ashore output data.

Variable	Columns	Format	Description
IDPNCH	1 - 10	A10	Identifying information to be punched onto the cards containing the buildup ashore output data.

Card and Facilities Card 2 (CF2).

CF2 gives the names of the transfer craft.

Variable	Columns	Format	Description
MCFT(1), I = 1, 5	1 - 50	5(A10)	Name of transfer craft I

Craft and Facilities Card 3 (CF3).

CF3 gives the total number of transfer craft of each type that are available.

Variable	Columns	Format	Description
ITCFT(I) I = 1,5	1 - 50	10I5	Number of transfer craft of type I that are available

Craft and Facilities Card 4 (CF4).

CF4 gives the capacity of each type of transfer craft, in short tons.

Variable	Columns	Format	Description
XTCFT (I,1) I = 1,5	1 - 25	4F5.0	Capacity of transfer craft type I

Craft and Facilities Card 5 (CF5).

CF5 gives the speed of each type of transfer craft.

Variable	Columns	Format	Description
XTCFT(I,2) I = 1,5	1 -25	5F5.0	Speed of transfer craft type I in knots

Craft and Facilities Card 6 (CF6).

CF6 gives the total number of each type of shoreside unloading facilities.

Variable	Columns	Format	Description
ISUFC(I,1) I = 1,5	1 - 25	5I5	Total number of shoreside unloading facilities of type I that are available

Craft and Facilities Card 7 (CF7).

CF7 gives the unloading rate for each type of shoreside unloading facility.

Variable	Columns	Format	Description
XSUFA(I) I = 1,5	1 - 25	5F5.0	Unloading rate for shoreside unloading facility type I in measurement tons per hour

Craft and Facilities Card 8 (CF8).

CF8 gives rates for offshore unloading facilities and delay times for each type of transfer craft.

Variable	Columns	Format	Description
IUP(I)	1 - 5	I5	Number of offshore unloading platforms available
XUP	6 - 10	F5.0	Unloading rate for the offshore unloading platforms in measurement tons per hour
TBKRTE	11 - 20	F10.0	Unloading rate for a pipeline unloading a tanker in measurement tons per hour
DTME(I)	21 - 35	3F5.0	Delay time for transfer craft type I in hours. This delay time is added to the cycle time for each type of transfer craft.

Ship Pool Status Card (SPL).

SPL gives cargo quantity criteria for ship pool activities, and the distance from ship to shore in over-the-beach operations.

Variable	Columns	Format	Description
DOFFSH	1 - 5	F5.0	Distance offshore (nautical miles) for over-the-beach operations
MTSHP	6 - 20	F15.0	Minimum measurement tons of cargo waiting at its service ports before a non-itinerary ship can leave the pool
MTSHLP	21 - 35	F15.0	Minimum measurement tons of cargo required for non-itinerary ship to change service port

Iteration Card (ITR).

ITR gives information necessary to rerun the program using modified input from the previous run.

Variable	Columns	Format	Description
TIMIT	1 - 10	F10.0	Time (in days) at which shortfall is tested (see SHTFLM). If no iterations are requested, TIMIT is set greater than the simulation end time.
DECR(1)-DECR(4)	11 - 50	4F10.0	Number of craft to be decremented from the total number of landing craft of the four types for each iteration
SHTFLM	51 - 60	F10.0	Maximum shortfall (amount of cargo built up at shore) allowed for next iteration. The number of landing craft is adjusted until SHTFLM is reached. If SHTFLM < 0, DEC1 - DEC4 are decremented from the numbers of the four landing craft types and the simulation is iterated until the number of landing craft necessary to meet the cargo delivery requirement is a minimum. Otherwise, the numbers of landing craft are increased until the cargo requirement is met.

Productivity Cards (PROD).

PROD cards give the transfer rates for each of the six berth facility types, considering the six transfer system types and eight cargo types. Thirty-six cards are input.

Variable	Columns	Format	Description
PRODUC(I,J,K)	1 - 48	8F6.0	Transfer rates (measurement tons per day) where I represents facility type, J represents transfer device, and K represents cargo type

Distance Table Cards (DIST).

DIST gives distances in nautical miles between ports. A 30x30 port table is read using three cards per port.

Variable	Columns	Format	Description
XDIST(I,J) where J=1,30 and I=1,30	1 - 60	10F6.0	Distance in nautical miles between port I and port J

Cargo Conversion Factor Card (ADJ).

ADJ gives the values needed to convert from measurement tons to short tons for each of the eight cargo types.

Variable	Columns	Format	Description
ADJCGO(I) where I=1,8 cargo types	1 - 48	8F6.0	Conversion factor for each cargo type, MT/LT

Table 2 gives the sequence of the input cards. Cards specified as input deck A are read from file 8. Cards with input deck B are read from file 5.

TABLE 2 - SEQUENCE OF INPUT DATA

CARD IDENTIFICATION	NUMBER OF CARDS	CARD DESCRIPTION	INPUT DECK
ITN1	1	Itinerary	A
ITN2	1 to 10	Itinerary	.
RDENT	1	Run Identification	.
GEN	1	General Information	.
CARG1	1	Cargo Generation	.
CARG2	1 to 1000	Cargo Generation	.
PRT	1 to 30	Port Information	.
STYP1	1 to 30	Ship Type I	.
STYP2	1 to 30	Ship Type II	.
SHP	1 to 100	Ship Information	.
MOD1	1	Ship Cards Modification Card 1	.
MOD2	1	Ship Cards Modification Card 2	.
MOD3	1	Ship Cards Modification Card 3	.
MOD4	1	Ship Cards Modification Card 4	.
INSUP	1	Initial Supply	.
PNCHID	1	Punch Identification Card	.
CF1	1	Craft and Facilities Card 1	.
CF2	1	Craft and Facilities Card 2	.
CF3	1	Craft and Facilities Card 3	.
CF4	1	Craft and Facilities Card 4	.
CF5	1	Craft and Facilities Card 5	.
CF6	1	Craft and Facilities Card 6	.
CF7	1	Craft and Facilities Card 7	.
CF8	1	Craft and Facilities Card 8	.
SPL	1	Ship Pool Status	.
REQ	1	Cargo Delivery Requirement	.
EOR	1	End of Record Card	.
ITR	1	Iteration	B
PROD	36	Productivity	.
DIST	90	Distance Table	.
ADJ	1	Cargo Conversion Factor	.

COMPUTER SYSTEM/RUN INFORMATION

The TRADES Model is written in FORTRAN IV and is designed to run on the CDC 6600 computer. The model requires 135K of core memory. The deck setup is given in Figure 2; Figure 3 lists the control cards necessary to make a computer run.

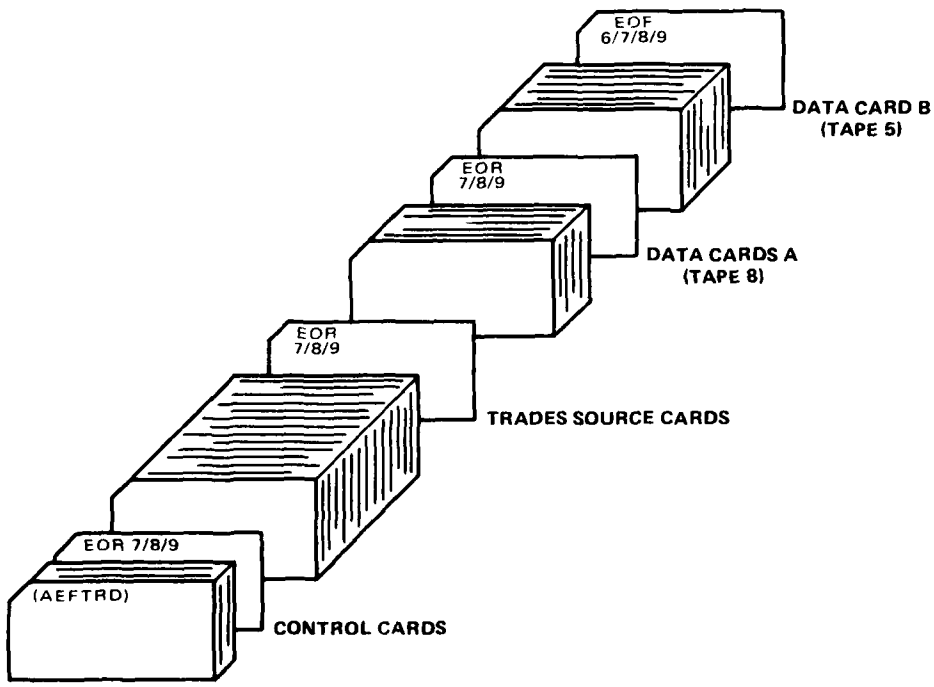


Figure 2 - Input Deck Setup

```
CAEFTRD,CM135000,P2.                    FRIEDENBERG, CODE 187
CHARGE,CAEF,ACCESS NO.
FTN.
CPRY CR(INPUT, TAPE()
LGO.
EOR -
                [
                |
                |
                |                       TRADES/SOURCE DECK
                |
                |
                [

EOR -
                [
                |
                |                       DECK A (DATA)
                |
                |
                [

EOR
                [                       DECK B (DATA)
                |
                |
                |
                |
                [

EOF-
```

Figure 3 - Control Cards

DESCRIPTION OF ROUTINES

This section gives a brief description of the TRADES routines. Flowcharts and program listings are also provided. Appendix A defines all major variables used in TRADES.

ROACH

Activity Performed: Initializes input/output files and begins execution of simulation

Type: Executive routine

Common Used: None

Called by: n/a

Stored by: n/a

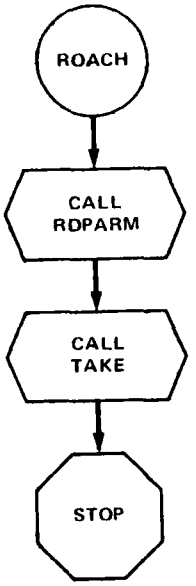
Subroutines Called: RDPARM, TAKE

Events Stored: None

Files used: Tape 5, Tape 6, Tape 8

Description

ROACH initializes input/output files to be used by the simulation. Execution of the simulation begins by calling RDPARM to input run parameters and to place initial events on the event list. ROACH calls TAKE to process events on the list.


ROACH
CALL
RDPARM
CALL
TAKE
STOP

```
PROGRAM ROACH      74/74   OPT=0 ROUND=*/ TRACE          FTN 4.8+508      07/23/81  09.54.22      PAGE     1

1               PROGRAM ROACH(INPUT,OUTPUT,PUNCH,TAPE8=INPUT,TAPE6=OUTPUT,          PAU I        2
               1 TAPE5,TAPE30)                                                       PAU I        3
                CALL RDPARM                                                          PAU I        4
                CALL TAKE                                                            PAU L        5
5               STOP                                                                 PAU I        6
                 END                                                                 PAU I        7
```

RDPARM (ITERAT)

Activity Performed: Inputs necessary data and stores initial events

Type: Subroutine

Common Used: /CONTRL/, /SUMY/, /DONNA/, /GEN/, /CARGOG/, /SHIP/, /PORT/, /WATE/, /B/, /BUSH1/, /BUSH2/, /PLT/

Called by: PRNTR, ROACH

Stored by: n/a

Subroutine Called: RNG

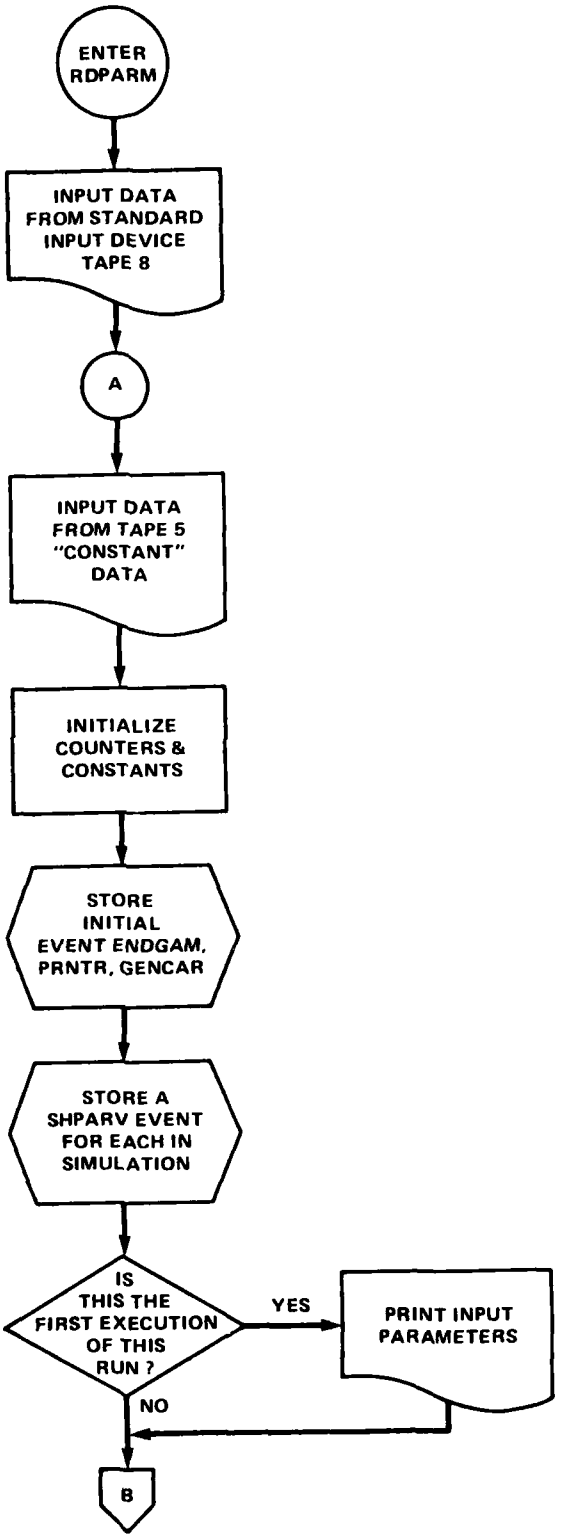
Events Stored: AVERAGE, ENDGAM, GENCAR, PRNTR, SHPARV, SPOOL

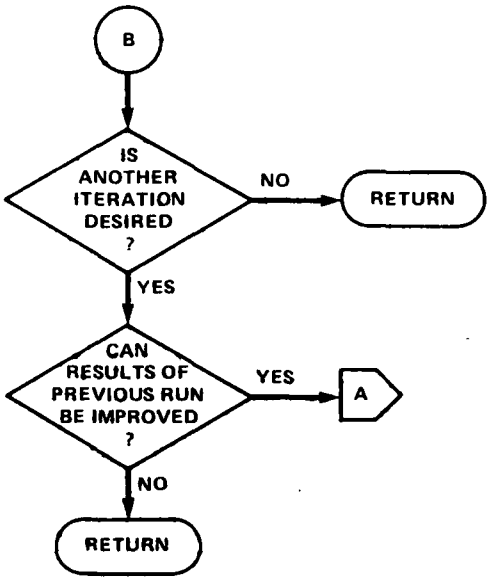
Files used: Tape 5, Tape 6, Tape 8

Description:

RDPARM inputs all data necessary to run the simulation. It starts the time/event processing by initializing control counters and placing events to be executed on the event list. Entries or events on the event list are ordered by occurrence in time.

Since TRADES is capable of simulating many cases by modifying initial input data in the same computer run, a second entry point, ITERAT, is provided. ITERAT is called from PRNTR. ITERAT initializes variables changed by the previous iteration, stores necessary events, and executes the next iteration using the modified data.


ENTER RDPARM
INPUT DATA FROM STANDARD INPUT DEVICE TAPE 8
A
INPUT DATA FROM TAPE 5 "CONSTANT" DATA
INITIALIZE COUNTERS & CONSTANTS
STORE INITIAL EVENT ENDGAM, PRNTR, GENCAR
STORE A SHPARV EVENT FOR EACH IN SIMULATION
IS THIS THE FIRST EXECUTION OF THIS RUN ?
YES
PRINT INPUT PARAMETERS
NO
B


B
IS ANOTHER ITERATION DESIRED ?
NO
RETURN
YES
CAN RESULTS OF PREVIOUS RUN BE IMPROVED ?
YES
A
NO
RETURN

```
      SUBROUTINE RDPARM                                                 RDPARM     2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    RDPARM     3
     1 ,ADJCGO(8),NTEST ,LOCRF(4),MTEST,TIMSAV ,ICRF(4)  ,SHTFLM        RDPARM     4
     1,KX,TBT,KTBT                                                      RDPARM     5
      COMMON /SUMY/ SUMSHP(30,10),SUMPRT(30,10) ,ISHPRT(30,6)           RDPARM     6
     1,NSO,ISO(50,3),UTM(50),PERC1(50),IAVAL(50)                        RDPARM     7
     1/DONNA/ IDA,IDR2,IMO,IOS ,IOAFCE,IOADMN,ND                        RDPARM     8
      COMMON/A/XCARGO(9),YCARGO(40,9),IOSCGO(40,2),ZCARGO(9),TCARGO,    RDPARM     9
     1DOFFSH,KQUEUE(50),XQUEUE(50),QTIME(5),MQUE(5)                     RDPARM    10
      COMMON                                                            RDPARM    11
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     RDPARM    12
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       RDPARM    13
     3,IGEN,PUTL                                                        RDPARM    14
     1/CARGCG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                       RDPARM    15
     2,JCARGO(1000,3),CARGO(1000),NSCGO,CARGC(2)                        RDPARM    16
     1/SHIP/NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)       RDPARM    17
     1/PORT/NPORT(30,6),IFAC(30,10)                                     RDPARM    18
     3,IQUEUE(1000,2),NQUEUE,NSE(30,30)                                 RDPARM    19
      COMMON/WATE/ITCFT(4,2),XTCFT(4,2),ISUFAC(2,2),XSUFAC(2),IUP(2),XUP RDPARM    20
     1,KTCFT(4),KSUFAC(2),KUP,NTCFT,NSUFAC,IUPCFT(4),IUPSUF(2),IUPUP    RDPARM    21
     2,TNKRTE                                                           RDPARM    22
      COMMON/BUSH1/DTME(3),UNLTC(4),TTCS(4),ATTCS(4),TUNLTC(4)          RDPARM    23
      COMMON /B/ KBLCFT,KBSFAC,KCJUC,KCCF,KCSFAC,KCTBK,KCUP,IAVRGE      RDPARM    24
     1 /PLT/ XAX(110),KY(110,7),IPLT,AA                                 RDPARM    25
      COMMON/BUSH2/NMCFT(5),KPNCH,XIS(9),IDPNCH                         RDPARM    26
      DIMENSION ITEMP(12), CARG(4), CHNGTH(3),TEMP(10),PRTNAM(30,2)     RDPARM    27
     1,RDENT(12),NNTYPE(40)                                             RDPARM    28
      DATA (CARG(I),I=1,4) /6HINITAL,6H CONST,6HUNIFCR,6HNORMAL/        RDPARM    29
      DATA (CHNGTH(I),I=1,3)  /4HBOTH,4HDVRY,4HNONE /                   RDPARM    30
C READ AND WRITE ALL INPUT PARAMETERS                                   RDPARM    31
      REWIND 5                                                          RDPARM    32
      READ(5,5000) TIMIT,DECR,SHTFLM                                    RDPARM    33
 5000 FORMAT(6F10.0)                                                    RDPARM    34
      WRITE(6,5001) TIMIT,DECR,SHTFLM                                   RDPARM    35
 5001  FORMAT(1H1,4X,*TIME TO TEST SHORTFALL =*,F10.0,* DAYS*,          RDPARM    36
     1 *, LANDING CRAFT DECREMENT =*,4F10.0,*, MAX SHORTFALL=*,F10.0)   RDPARM    37
      READ(5,10) (((PRODUC(I,J,K),K=1,8),J=1,6),I=1,6)                  RDPARM    38
   10 FORMAT(8F6.0,32X)                                                 RDPARM    39
      READ(5,11) ((XDIST(I,J),J=1,30),I=1,30)                           RDPARM    40
   11 FORMAT(10F6.0,20X)                                                RDPARM    41
      READ(5,13) ADJCGO                                                 RDPARM    42
   13 FORMAT(8F6.0)                                                     RDPARM    43
      WRITE(6,101) (((PRODUC(I,J,K),K=1,8),J=1,6),I=1, 6)               RDPARM    44
  101 FORMAT(77H1 PRODUCTIVITY RATES BASED ON CARGO TYPE, TRANSFER SYSTE RDPARM    45
     1M  AND FACILITY TYPE / (8F12.0)  )                                RDPARM    46
      WRITE(6,102) ((XDIST(I,J),J=1,30) ,I=1,30)                        RDPARM    47
  102 FORMAT(//30H DISTANCE MATRIX FOR 30 PORTS / (10F12.0)  )          RDPARM    48
      WRITE(6,104) ADJCGO                                               RDPARM    49
  104 FORMAT(//48H CONVERSION FACTORS FOR EACH CARGO TYPE (MT/LT) /     RDPARM    50
     1 8F12.2//)                                                        RDPARM    51
      GO TO 5002                                                        RDPARM    52
      ENTRY ITERAT                                                      RDPARM    53
C     TEST FOR STOP AFTER ONE ITERATION                                 RDPARM    54
      IF(KX.EQ.7) STOP                                                  RDPARM    55
 5002 READ(5,14) NITIN,KX,KTAV                                          RDPARM    56
      TBT=0.                                                            RDPARM    57
      KTBT=0                                                            RDPARM    58
```

```
                IF(NITIN.LE.0) GO TO 142                                          RDPARM     59
                READ(5,14) (((ITIN(J,K),K=1,10),J=1,NITIN)                        RDPARM     60
60            14 FORMAT(10I3)                                                     RDPARM     61
             142 READ(5,17) (RDENT(I),I=1,12)                                     RDPARM     62
              17 FORMAT (12A6)                                                    RDPARM     63
            2000 FORMAT(1H1,4X,12A6,24(/),                                        RDPARM     64
               1$1X,*REQUIREMENTS EVALUATED AGAINST*                              RDPARM     65
65             1 /51X,* CARGO TRANSPORTATION (REACT)*)                           RDPARM     66
                IF(NTEST.LE.0) WRITE(6,2000) RDENT                                RDPARM     67
                READ(5,48) NSHIPS,NSTYP,NNPORT,NFACT,NTEA,IOUT,TINVL,ENDTIM       RDPARM     68
                TIMSAV=TINVL                                                      RDPARM     69
              48 FORMAT (6I9,3F6.0)                                               RDPARM     70
70              READ(5,1114) NCARGN                                               RDPARM     71
            1114 FORMAT(5I10,30X)                                                 RDPARM     72
                DO 143 I=1,NCARGN                                                 RDPARM     73
                READ(5,401) (ITEMP(J),J=1,3)                                      RDPARM     74
                KARGEN(I,1)=MOD(ITEMP(1)/10000,10)+MOD(ITEMP(1)/100,100)*10       RDPARM     75
75             1+MOD( ITEMP(1),100)*10C0+MOD(ITEMP(1)/100000,10) *10**5           RDPARM     76
                KARGEN(I,1)=KARGEN(I,1)+MOD(ITEMP(1)/1000000,100)*10**9           RDPARM     77
                KARGEN(I,2)=MOD(ITEMP(2),100000)+(ITEMP(2)/1000000)*10**7         RDPARM     78
                KARGEN(I,3)=(ITEMP(1)/10**11)*10**10+MOD(ITEMP(1)/10**8,1000)*1000 RDPARM    79
             143 CONTINUE                                                         RDPARM     80
80          401    FORMAT    (I14,2I10)                                          RDPARM     81
                DO 1143 I=1,NNPORT                                                RDPARM     82
                READ(5,41) IFAC(I,3),IFAC(I,2),IFAC(I,1),IFAC(I,6),IFAC(I,5),     RDPARM     83
               1 IFAC(I,4),NPORT(I,1),(TEMP(J),J=1,4),PRTNAM(I,1),PRTNAM(I,2)     RDPARM     84
               2,NPORT(I,5)                                                       RDPARM     85
85            41 FORMAT(6I3,I1,4F6.0,2A6,I1,24X)                                  RDPARM     86
                NPORT(I,2)=TEMP(1)*100.                                           RDPARM     87
                NPORT(I,3)=TEMP(4)                                                RDPARM     88
                NPORT(I,4) =TEMP(3)                                               RDPARM     89
            1143 NPORT(I,6)=TEMP(2)*1000                                          RDPARM     90
90              DO 144 I=1,NSTYP                                                  RDPARM     91
                READ(5,42)(TEMP(J),J=1,7),MTSHP2(I,6),MTSHP2(I,5) ,MTSHP2(I,4) ,  RDPARM     92
               2 MTSHP2(I,3),MTSHP2(I,2),MTSHP2(I,1), MTSHP2(I,7),MTSHIP(I,6),   RDPARM     93
               3 MTSHIP(I,5),MTSHIP(I,4),MTSHIP(I,3),MTSHIP(I,2),MTSHIP(I,1),    RDPARM     94
               4 MTSHIP(I,9),MTSHIP(I,10),MTSHP2(I,9)                             RDPARM     95
95              READ(5,1144) (MTSHIP(I,J),J=17,22)                                RDPARM     96
            1144 FORMAT(6I4)                                                      RDPARM     97
                MTSHIP(I,11)=TEMP(3)                                              RDPARM     98
                MTSHIP(I,12)=TEMP(2)                                              RDPARM     99
                MTSHIP(I,13)=TEMP(6)                                              RDPARM    100
100             MTSHIP(I,14)=TEMP(1)                                              RDPARM    101
                MTSHIP(I,15)=TEMP(4)                                              RDPARM    102
                MTSHIP(I,16)=TEMP(5)                                              RDPARM    103
                MTSHP2(I,8)=TEMP(7)*1000.                                         RDPARM    104
             144 CONTINUE                                                         RDPARM    105
105           42 FORMAT(7F8.8,I2,6I1,2X,6I1,3I1,5X)                               RDPARM    106
                READ(5,43) (NSHIP(I,6),NSHIP(I,2),NSHIP(I,7),NSHIP(I,1),         RDPARM    107
               1 NSHIP(I,1),NSHIP(I,5),NSHIP(I,3),I=1,NSHIPS)                     RDPARM    108
              43 FORMAT(4(I3,2I2,1X,I1,I2,3X,I1,I2),12X)                          RDPARM    109
                READ(5,501) NCT                                                   RDPARM    110
110           501 FORMAT(I3)                                                      RDPARM    111
              502 FORMAT(40I2)                                                    RDPARM    112
                READ(5,502) (NNTYPE(I),I=1,NCT)                                   RDPARM    113
                READ(5,501) NNAVAIL                                               RDPARM    114
                READ(5,501) NNNA                                                  RDPARM    115
```

```
115               READ(5,503) (XIS(I),I=1,7)                                    RDPARM  116
                503 FORMAT(8F10.0)                                              RDPARM  117
                    READ(5,1006) NTCFT,NSUFAC  ,KPNCH                           RDPARM  118
                    READ(5,1118) IDPNCH                                         RDPARM  119
                    READ(5,1118) (NMCFT(I),I=1,NTCFT)                           RDPARM  120
120             1118 FORMAT(7A10)                                               RDPARM  121
                1006 FORMAT(10I5)                                               RDPARM  122
                    IF(NTEST.LE.0) READ(5,1006) (ITCFT(I,1),I=1,NTCFT)          RDPARM  123
                    IF(NTEST.GT.0) READ(5,1006) (ITEMP(I),I=1,4)                RDPARM  124
                    READ(5,802) (XTCFT(I,1),I=1,NTCFT)                          RDPARM  125
125                 READ(5,802)(XTCFT(I,2),I=1,NTCFT)                           RDPARM  126
                 802 FORMAT( 10F5.0 )                                           RDPARM  127
                    IF(NTEST.LE.0)    GO TO 8888                                RDPARM  128
                    ISAVE=0                                                     RDPARM  129
                    DO 8887 II=1,4                                              RDPARM  130
130                 ITCFT(II,1)=LOCRF(II)                                       RDPARM  131
                    IF(NTEST.NE.1) GO TO 8886                                   RDPARM  132
                    GO TO 8887                                                  RDPARM  133
                8886 ITCFT(II,1)=ITCFT(II,1)-DECR(II)                           RDPARM  134
                    IF(ITCFT(II,1).GT.0) GO TO 8887                             RDPARM  135
135                 ISAVE=ISAVE+1                                               RDPARM  136
                    ITCFT(II,1)=0                                               RDPARM  137
                8887 CONTINUE                                                   RDPARM  138
                    IF(ISAVE.EQ.4) STOP                                         RDPARM  139
                8888 READ(5,1006)(ISUFAC(I,1),I=1,NSUFAC)                       RDPARM  140
140                 READ(5,802) (XSUFAC(I),I=1,NSUFAC)                          RDPARM  141
                    READ(5,803) IUP(1),XUP,TNKRTE,DTME                          RDPARM  142
                 803 FORMAT(I5,F5.0,F10.0,3F5.0)                                RDPARM  143
                    READ(5,1010) DOFFSH,(CARGC(J),J=1,2)                        RDPARM  144
                1010 FORMAT(F5.0,2F15.0)                                        RDPARM  145
145                 READ(5,2001) IGEN,PUTL                                      RDPARM  146
                2001 FORMAT(I5,F10.2)                                           RDPARM  147
                    READ(5,100) IDP,IDR2,IMD,IOS,IOAFOE,IOADMN,ND               RDPARM  148
                 100 FORMAT(7I3)                                                RDPARM  149
              C     COMPUTE UNLOADING TIME FOR EACH TYPE OF TRANSFER CRAFT (IN HOURS) RDPARM  150
150                 UNLTC(1)=XTCFT(1,1)/XSUFAC(1)                               RDPARM  151
                    UNLTC(2)=XTCFT(2,1)/XSUFAC(1)                               RDPARM  152
                    UNLTC(3)=XTCFT(3,1)/XSUFAC(2)                               RDPARM  153
                    UNLTC(4)=XTCFT(3,1)/2718.                                   RDPARM  154
                    DO 300 I=1,NSTYP                                            RDPARM  155
155                 ITTC=MTSHIP(I,21)                                           RDPARM  156
                    ITSUF=MTSHIP(I,22)                                          RDPARM  157
              C     CHECK IF SHIP IS BREAK BULK                                 RDPARM  158
                    IF(MTSHIP(I,20).NE.1) GO TO 200                             RDPARM  159
              C     SHIP IS BREAK BULK                                          RDPARM  160
160           C     COMPUTE PRODUCTIVITY FOR TRANSFER CRAFT                     RDPARM  161
                    X1=XTCFT(ITTC,1)/60.                                        RDPARM  162
                    X2=2.*DOFFSH/XTCFT(ITTC,2)                                  RDPARM  163
                    X3=XTCFT(ITTC,1)/XSUFAC(ITSUF)                              RDPARM  164
                    PRORTE=XTCFT(ITTC,1)/(X1+X2+X3)                             RDPARM  165
165           C     COMPUTE NUMBER OF TRANSFER CRAFT REQUIRED TO UNLOAD SHIP    RDPARM  166
                    MTSHIP(I,17)=240./PRORTE+1.                                 RDPARM  167
              C     COMPUTE NUMBER OF SHORESIDE UNLOADING FACILITIES REQUIRED   RDPARM  168
                    X4=MTSHIP(I,17)                                             RDPARM  169
                    MTSHIP(I,19)=(X4*PRORTE)/XSUFAC(ITSUF)+1.                   RDPARM  170
170                 GO TO 300                                                   RDPARM  171
              C     CHECK IF SHIP IS CONTAINERSHIP                              RDPARM  172
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```
      200 IF(MTSHIP(I,20).NE.2) GO TO 210                                RDPARM  173
C         SHIP IS CONTAINERSHIP                                          RDPARM  174
C         COMPUTE PRODUCTIVITY FOR TRANSFER CRAFT                        RDPARM  175
175       X1=XTCFT(ITTC,1)/XUP                                           RDPARM  176
          X2=2.*DOFFSH/XTCFT(ITTC,2)                                     RDPARM  177
          X3=XTCFT(ITTC,1)/XSUFAC(ITSUF)                                 RDPARM  178
          PRORTE=XTCFT(ITTC,1)/(X1+X2+X3)                                RDPARM  179
C         COMPUTE NUMBER OF TRANSFER CRAFT REQUIRED TO UNLOAD SHIP       RDPARM  180
180       MTSHIP(I,17)=XUP/PRORTE+1.                                     RDPARM  181
C         COMPUTE NUMBER OF SHORESIDE UNLOADING FACILITIES REQUIRED      RDPARM  182
          X4=MTSHIP(I,17)                                                RDPARM  183
          MTSHIP(I,19)=(X4*PRORTE)/XSUFAC(ITSUF)+1.                      RDPARM  184
          GO TO 300                                                      RDPARM  185
185       C     CHECK IF SHIP IS RO/RO                                   RDPARM  186
      210 IF(MTSHIP(I,20).NE.3) GO TO 300                                RDPARM  187
C         SHIP IS RO/RO                                                  RDPARM  188
C         COMPUTE PRODUCTIVITY FOR TRANSFER CRAFT                        RDPARM  189
          X1=XTCFT(ITTC,1)/2718.                                         RDPARM  190
190       X2=2.*DOFFSH/XTCFT(ITTC,2)                                     RDPARM  191
          X3=XTCFT(ITTC,1)/2718.                                         RDPARM  192
          PRORTE=XTCFT(ITTC,1)/(X1+X2+X3)                                RDPARM  193
C         COMPUTE NUMBER OF TRANSFER CRAFT REQUIRED TO UNLOAD SHIP       RDPARM  194
          MTSHIP(I,17)=2718./PRORTE+1.                                   RDPARM  195
195       300 CONTINUE                                                   RDPARM  196
C          INITIALIZE VARIABLES                                          RDPARM  197
          CALL RNG1                                                      RDPARM  198
C         STORE INITIAL EVENTS                                           RDPARM  199
          TEVENT=1.0                                                     RDPARM  200
200       LVENT1=1                                                       RDPARM  201
          CALL PUT                                                       RDPARM  202
          TEVENT=5.0                                                     RDPARM  203
           LVENT1=6                                                      RDPARM  204
          CALL PUT                                                       RDPARM  205
205       TEVENT=ENDTIM                                                  RDPARM  206
          LVENT1=8                                                       RDPARM  207
          CALL PUT                                                       RDPARM  208
          LVENT1=?                                                       RDPARM  209
          TSP=999.                                                       RDPARM  210
210       DO 20 I=1,NSHIPS                                               RDPARM  211
          NSHIP(I,6)=NSHIP(I,6)*100                                      RDPARM  212
          TEVENT=FLOAT(NSHIP(I,6))*.01                                   RDPARM  213
          IP=NSHIP(I,3)                                                  RDPARM  214
          NSHIP(I,4)=NPORT(IP,1)                                         RDPARM  215
215       IF(TSP.GT.TEVENT) TSP=TEVENT                                   RDPARM  216
          IF(NSHIP(I,15).NE.2) GO TO 33333                               RDPARM  217
          TEVENT=TEVENT+NNNA                                             RDPARM  218
          GO TO 403                                                      RDPARM  219
      33333 DO 4033 J=1,NCT                                              RDPARM  220
220       IF(NSHIP(I,1).EQ.NNTYPE(J)) GO TO 43333                        RDPARM  221
       4033 CONTINUE                                                     RDPARM  222
          GO TO 40333                                                    RDPARM  223
      43333 IF(TEVENT.LE.NNAVAIL) GO TO 4031                             RDPARM  224
      40333 TEVENT=200.                                                  RDPARM  225
225       GO TO 403                                                      RDPARM  226
       4031 IF(NSHIP(I,15).NE.3) TEVENT=TEVENT+NNNA                      RDPARM  227
        403 NSHIP(I,6)=TEVENT*100.                                       RDPARM  228
          LVENT2=I                                                       RDPARM  229
```

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                  LVENT3=NSHIP(I,2)                                                 RDPARM   230
230               LVENT1=2                                                          RDPARM   231
                  CALL PUT                                                          RDPARM   232
                  NSHIP(I,12)=2                                                     RDPARM   233
                  ITYPE=NSHIP(I,1)                                                  RDPARM   234
                  NSHIP(I,9)=FLOAT(MTSHIP(ITYPE,11))*PUTL                           RDPARM   235
235               NSHIP(I,8)=MTSHP2(ITYPE,9)                                        RDPARM   236
                  NSHIP(I,10)=MTSHIP(ITYPE,12)                                      RDPARM   237
                  NSHIP(I,11)=1                                                     RDPARM   238
                20 CONTINUE                                                         RDPARM   239
                  IF(ND.GT.0) TSP=ND                                                RDPARM   240
240               TEVENT=TSP  *.001                                                 RDPARM   241
                  LVENT1=7                                                          RDPARM   242
                  CALL PUT                                                          RDPARM   243
                  TEVENT=1.                                                         RDPARM   244
                  LVENT1=10                                                         RDPARM   245
245               CALL PUT                                                          RDPARM   246
                  IF(NTEST.GT.0) GO TO 6666                                         RDPARM   247
                  WRITE(6,60)(RDENT(I),I=1,12),NSTYP,NSHIPS,NTEA,NNPORT,NFACT,      RDPARM   248
                 1NITIN,TINVL,ENOTIM,TINVL                                          RDPARM   249
                60 FORMAT (32H1   G E N E R A L    I N P U T S ///6X,25HDATA IDENTIFI RDPARM   250
250               1CATION IS   12A6///6X,28HNUMBER OF SHIP TYPES IN GAME 8X,1H=,I7/  RDPARM   251
                  26X,23HNUMBER OF SHIPS IN GAME 13X,1H=,I7/6X,26HNUMBEER OF THEATRES RDPARM   252
                  3IN GAME 10X,1H=I7/6X,23HNUMBER OF PORTS IN GAME 13X,1H=I7/6X,32HNU RDPARM   253
                  4MBER OF FACILITY TYPES IN GAME 4X,1H=I7/6X29HNUMBER OF ITINERARIES RDPARM   254
                  5 IN GAME 7X,1H=I7//6X,68HTIME INTERVAL BETWEEN PERIODIC SYSTEM STA RDPARM   255
255               6TUS PRINTOUT (IN DAYS)  IS F7.0//6X,44HTIME FOR MAXIMUM LENGTH OF  RDPARM   256
                  7PLAY IN DAYS  IS  F7.0 // 6X,45H FIRST SYSTEM STATUS PRINTOUT(*N D RDPARM   257
                  8AYS) IS AT F7.0 //)                                              RDPARM   258
                   IF  (NITIN)              621,621,6101                          RDPARM   259
               6101 WRITE(6,611)                                                    RDPARM   260
260             611  FORMAT(/6X,16HITINERARY INPUTS/,10X,13HITINERARY NO., 8X,28HPORTS RDPARM   261
                  1ON ITINERARY(IN ORDER) / )                                       RDPARM   262
                   DO 615 I=1,NITIN                                                 RDPARM   263
                   WRITE(6,614) I,(ITIN(I,J),J=1,10)                                RDPARM   264
                614  FORMAT(15X,I2, 14X,10I6)                                     RDPARM   265
265             615  CONTINUE                                                      RDPARM   266
                621 WRITE(6,63)                                                     RDPARM   267
                 63 FORMAT(36H1...P O R T    I N F O R M A T I O N ///10X,4HPORT,11X, RDPARM   268
                  17HTHEATRE,4X,4HPORT,6X,6HADJUST,4X,5HCARGO,5X,4HMAX.,5X,      9X, RDPARM   269
                  234HNO. FACILITIES AVAILABLE (BY TYPE) / 25X,7HOF PORT,4X,5HDELAY, RDPARM   270
270               36X,3HFOR,6X,6HHANDLE,4X,5HDRAFT              /36X,4HTIME,6X,6HPRODUC RDPARM   271
                  44X,6HCST/DA,4X,4H(FT),5X,         9X,2H 1,4X,2H 2,4X,2H 3,4X,2H 4, RDPARM   272
                  54X,2H 5,4X,2H 6 /36X,6H(DAYS)5X,4HRATE,5X,5H( $ ) //)            RDPARM   273
                   DO 65 I = 1,NNPORT                                               RDPARM   274
                   TEMP(1)=FLOAT(NPORT(I,2))*.01                                    RDPARM   275
275                TEMP(2)=FLOAT(NPORT(I,6))*.001                                   RDPARM   276
                   TEMP(3)=NPORT(I,4)                                               RDPARM   277
                   TEMP(4)=NPORT(I,3)                                               RDPARM   278
                   WRITE(6,66) I,PRTNAM(I,1),PRTNAM(I,2),NPORT(I,1)                 RDPARM   279
                  1,(TEMP(J),J=1,4),(IFAC(I,J),J=1,6)                               RDPARM   280
280              66 FORMAT( 6X, I2, 2X,2A6,5X,I3,7X,F4.1,5X,F5.3,3X,F8.0,4X,F5.0,9X, RDPARM   281
                  1 6(3X,I3)/)                                                      RDPARM   282
                 65 CONTINUE                                                        RDPARM   283
                   WRITE (6,70)                                                     RDPARM   284
                 70 FORMAT(//47H ...S H I P    T Y P E    I N F O R M A T I O N ///6X, RDPARM   285
285               14HSHIP,3X,5HSPEED4X,5HCARGO4X,5HCARGO4X,4HCOST7X,4HCOST6X,4HSHIP,  RDPARM   286
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                25X,5HMULTI5X,3HNO.3X,12H   BY TYPE   4X,11HCARGO TYPES3X,8HFACILIT RDPARM    287
                3Y 3X,4HTMTR /6X, 4HTYPE ,                                         RDPARM    288
                43X,5H(KTS)5X,2HMT7X,3HVOL5X,6HAT SEA4X,7HIN PORT4X,5HDRAFT4X,      RDPARM    289
                55HTRANS5X,5HTRANS,1X,12H 1 2 3 4 5 617X,12HPREFERENCE,2X,4HCHNG /  RDPARM    290
298             622X,4H(LT)6X,4H(MT)4X,6H($/DA)                                     RDPARM    291
                7  5X,6H($/DA)4X,4H(FT)5X,6HADJUST4X,4HSYST ,3X,12H(0=NO,1=YES) /  RDPARM    292
                8 70X,6HFACTOR /  )                                                 RDPARM    293
                 DO 71 I=1,NSTYP                                                    RDPARM    294
                 TEMP(1)=MTSHIP(I,14)                                               RDPARM    295
295              TEMP(2)=MTSHIP(I,12)                                               RDPARM    296
                 TEMP(3)=MTSHIP(I,11)                                               RDPARM    297
                 TEMP(4)=MTSHIP(I,15)                                               RDPARM    298
                 TEMP(5)=MTSHIP(I,16)                                               RDPARM    299
                 TEMP(6)=MTSHIP(I,13)                                               RDPARM    300
300              TEMP(7)=FLOAT(MTSHP2(I,8))*.001                                    RDPARM    301
                 JTEMP=MTSHP2(I,9)                                                  RDPARM    302
                 DISTR = CHNGTH(JTEMP+1)                                            RDPARM    303
              71 WRITE(6,72) I,(TEMP(J),J=1,7),MTSHP2(I,7),(MTSHP2(I,J),J=1,6),     RDPARM    304
                1 (MTSHIP(I,J),J=1,5),MTSHIP(I,9),MTSHIP(I,10),DISTR                RDPARM    305
305           72 FORMAT(9X,I2,3X,F5.1,3X,F7.0,2X,F8.0,2X,F6.0,4X,F6.0,5X,F5.0,4X,   RDPARM    306
                1 F6.3,5X,I2,3X,6(1X,I1),4X,5(1X,I1),6X,I1,4X,I1 ,3X,A4 / )         RDPARM    307
                 WRITE(6,4422)                                                      RDPARM    308
                 PRINT 1215                                                         RDPARM    309
           1215 FORMAT(3X,*SHIP   TYPE OF    NUMBER OF   SHORESIDE     NUMBER OF   RDPARM    310
310             1 SHIP TYPE*/3X,*TYPE   TRANSFER   TRANSFER    UNLOADING     SHORES RDPARM    311
                2IDE    INDICATOR*/11X,*CRAFT      CRAFT       DEVICE       UNLOADI RDPARM    312
                3NG   1=BB,2=CONT,*/33X,*1=FORKLIFTS    DEVICES    3=R/R,4=LASH,*/  RDPARM    313
                433X,*2=CRANES*,19X,*5=TANKER*//)                                   RDPARM    314
                 DO 1216 I=1,NSTYP                                                  RDPARM    315
           1216 PRINT 1217, I,MTSHIP(I,21),MTSHIP(I,17),MTSHIP(I,22),MTSHIP(I,19), RDPARM    316
                1MTSHIP(I,20)                                                       RDPARM    317
           1217 FORMAT(I6,I9,5X,I6,7X,I5,8X,I6,8X,I5)                               RDPARM    318
                WRITE (6,740)                                                       RDPARM    319
           740  FORMAT (37H1. . .  C A R G O  G E N E R A T E D // 99H      NO.     RDPARM    320
320             1  TYPE    ORIGIN    DESTIN    FREQ    DISTRI-    PARAMETER    PARA RDPARM    321
                2METER    START     END /22X,4HPORT6X,4HPORT14X,6HBUTION8X,1H112X,  RDPARM    322
                31H28X,2(*TIME*,6X)///)                                             RDPARM    323
                 DO 745 I=1,NCARGN                                                  RDPARM    324
                 ITEMP(1)=MOD(KARGEN(I,1),10)                                       RDPARM    325
325              ITEMP(2)=MOD(KARGEN(I,1)/10,100)                                   RDPARM    326
                 ITEMP(3)=MOD(KARGEN(I,1)/1000,100)                                 RDPARM    327
                 FR=FLOAT(KARGEN(I,1)/100000)*.001                                  RDPARM    328
                 JTEMP=MOD(KARGEN(I,1)/100000,10)+1                                 RDPARM    329
                 DISTR=CARG(JTEMP)                                                  RDPARM    330
330              ITEMP(5)=MOD(KARGEN(I,2),10000000)                                 RDPARM    331
                 ITEMP(6)=KARGEN(I,2)/10000000                                      RDPARM    332
                 TS=FLOAT(MOD(KARGEN(I,3),100000000))*.001                          RDPARM    333
                  TE=FLOAT(KARGEN(I,3)/100000000)*.001                              RDPARM    334
                 WRITE(6,744) I,(ITEMP(J),J=1,3),FR,DISTR,(ITEMP(J),J=5,6),TS,TE    RDPARM    335
335           744 FORMAT(2(5X,I3),2(8X,I2),F8.3,6X,A6,2X,I10,6X,I5,2F10.3)          RDPARM    336
              745 CONTINUE                                                          RDPARM    337
                 WRITE(6,75)                                                        RDPARM    338
               75 FORMAT(56H1  S H I P    I N I T I A L I Z A T I O N    V A L U E S RDPARM    339
                1// ,6X,4HSHIP4X,4HSHIP4X,4HSHIP6X,4HSHIP7X,8HDELIVERY4X,4HHOME4X,  RDPARM    340
340             27HINITIAL,5X,4HTIME /                                              RDPARM    341
                3          6H,3HNO.5X,4HOWNR4X,4HTYPE4X,9HITINERARY4X,7HTHEATRE5X,  RDPARM    342
                44HPORT5X,4HPORT,7X,5HAVAIL //)                                     RDPARM    343
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                ISAVE=NSHIP(I,2)                                                RDPARM  344
                NSHIP(I,4)=NPORT(ISAVE,1)                                       RDPARM  345
345              DO 76 I=1,NSHIPS                                               RDPARM  346
                ITEMP(1)=NSHIP(I,15)                                            RDPARM  347
                 ITEMP(2)=NSHIP(I,1)                                            RDPARM  348
                 ITEMP(3)=NSHIP(I,7)                                            RDPARM  349
                 ITEMP(4)=NSHIP(I,5)                                            RDPARM  350
350             ITEMP(5)=NSHIP(I,3)                                             RDPARM  351
                ITEMP(6)=NSHIP(I,2)                                             RDPARM  352
                TAV=FLOAT(NSHIP(I,6))*.01                                       RDPARM  353
                IF(KTAV.EQ.7.AND.TAV.LT.199.5) TAV=7.                           RDPARM  354
                WRITE(6,77) I,(ITEMP(N),N=1,6),TAV                              RDPARM  355
355           77 FORMAT(I3,2I8,I10,I13,I10,I12,F12.2  )                         RDPARM  356
              76 CONTINUE                                                       RDPARM  357
            6666 KTEST=NTEST+1                                                  RDPARM  358
                 IF(NTEST.EQ.1) KTEST=KTEST+1                                   RDPARM  359
                WRITE(6,4423) KTEST,SHTFL                                       RDPARM  360
360         4423 FORMAT(1H1,4X,* ITERATION =*,I4,*,MIN. SHTFL =*,F10.0///       RDPARM  361
               1 21X,*TRANSFER CRAFT INFORMATION*)                              RDPARM  362
            4422 FORMAT(1H1)                                                    RDPARM  363
                PRINT 1101                                                      RDPARM  364
            1101 FORMAT(1H0,6X,*TYPE*,7X,*NAME*,6X,*NUMBER*,3X,*CAPACITY*,3X,   RDPARM  365
365            1*SPEED(KTS)*/)                                                  RDPARM  366
                DO 1102 I=1,NTCFT                                               RDPARM  367
            1102 PRINT 1103, I,NMCFT(I),ITCFT(I,1),XTCFT(I,1),XTCFT(I,2)        RDPARM  368
            1103 FORMAT(4X,I6,5X,A10,I7,4X,F8.0,F10.0)                          RDPARM  369
                PRINT 1104                                                      RDPARM  370
370         1104 FORMAT(1H-,20X,*MATERIAL HANDLING FACILITIES*)                 RDPARM  371
                PRINT 1105                                                      RDPARM  372
            1105 FORMAT(1H0,13X,*NAME*,18X,*NUMBER*,5X,*UNLOADING/LOADING RATE (MT/ RDPARM  373
               1HR)*/)                                                          RDPARM  374
                PRINT 1106, ISUFAC(1,1),XSUFAC(1)                               RDPARM  375
375         1106 FORMAT(10X,*FORKLIFTS*,15X,I6,15X,F8.0)                        RDPARM  376
                PRINT 1107, ISUFAC(2,1),XSUFAC(2)                               RDPARM  377
            1107 FORMAT(7X,*SHORESIDE CRANES*,11X,I6,15X,F8.0)                  RDPARM  378
                PRINT 1108, IUP(1),XUP                                          RDPARM  379
            1108 FORMAT(1X,*CONTAINER UNLOADING PLATFORMS*,4X,I6,15X,F8.0)      RDPARM  380
380             PRINT 1109, ITCFT(4,1),TNKRTE                                   RDPARM  381
            1109 FORMAT(7X,*TANKER PIPELINES*,11X,I6,15X,F8.0)                  RDPARM  382
                PRINT 1771, DOFFSH                                              RDPARM  383
            1771 FORMAT(1H-,5X,*DISTANCE OFFSHORE =*,F7.1,* MILES*)             RDPARM  384
                PRINT 4422                                                      RDPARM  385
385             WRITE(6,2002) CARGC                                             RDPARM  386
            2002 FORMAT(//5X,*MTS REQUIRED FOR SHIP TO LEAVE POOL =*,F12.2/     RDPARM  387
               15X,*MTS REQUIRED FOR SHIP TO CHANGE LOAD PORT =*,F12.2)         RDPARM  388
                WRITE(6,2003) IGEN,PUTL                                         RDPARM  389
            2003 FORMAT(5X,*CARGO GENERATION CHECK OPTION =*,I3/                 RDPARM  390
390            15X,*SHIP VOLUME UTILIZATION =*,F7.3)                            RDPARM  391
                IF(IOUT.EQ.1) WRITE(6,999)                                      RDPARM  392
             999 FORMAT(1H1,*TIME (DAYS)*,5X,*PORT*,5X,*SHIP*,5X,               RDPARM  393
               1*TRANSACTION DESCRIPTION*)                                      RDPARM  394
                RETURN                                                          RDPARM  395
395             END                                                             RDPARM  396
```

AVRAGE

Activity Performed: Keeps track of the numbers of transport craft and cargo transfer facilities in use.

Type: Event

Common Used: /CONTRL/, /A/, /B/, /GEN/, /CARGOG/,/SHIP/, /PORT/, /PLT/, /WATE/

Called by: TAKE

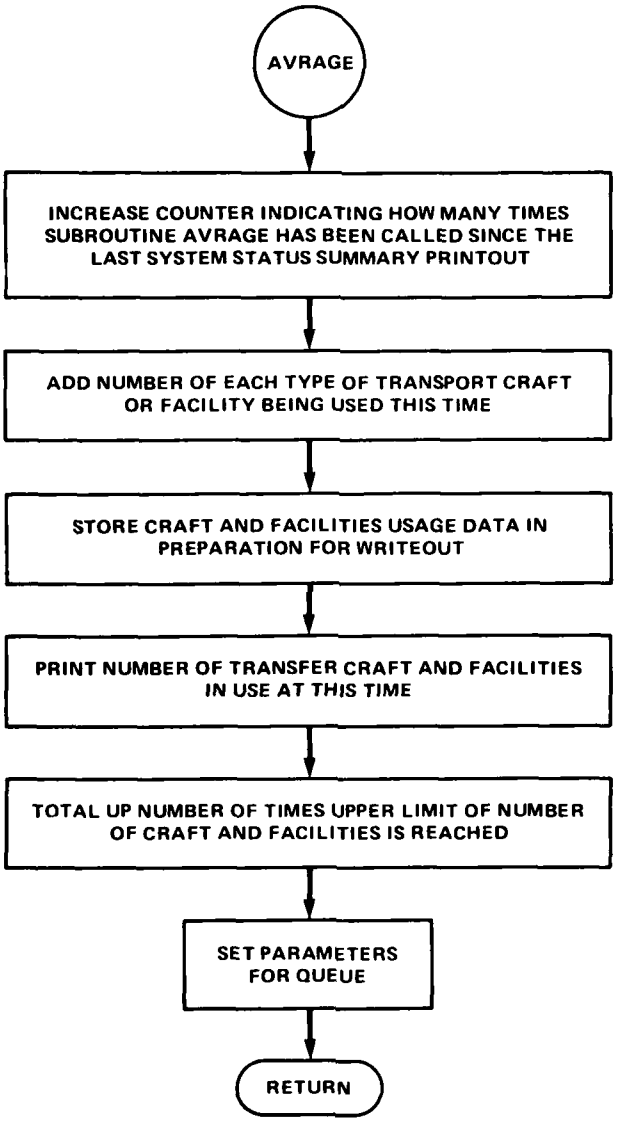
Stored by: RDPARM

Subroutines Called: PUT, MAXO

Events Stored: AVRAGE

Description:

AVRAGE stores data on transport craft and transfer facilities to be used later by PRNTR in calculating the average numbers in use. It prints current craft and facilities usage data and writes these data on a disk file. AVRAGE keeps track of the total number of times the upper limits (input) on the number of available craft and facilities are reached.


AVRAGE
INCREASE COUNTER INDICATING HOW MANY TIMES SUBROUTINE AVRAGE HAS BEEN CALLED SINCE THE LAST SYSTEM STATUS SUMMARY PRINTOUT
ADD NUMBER OF EACH TYPE OF TRANSPORT CRAFT OR FACILITY BEING USED THIS TIME
STORE CRAFT AND FACILITIES USAGE DATA IN PREPARATION FOR WRITEOUT
PRINT NUMBER OF TRANSFER CRAFT AND FACILITIES IN USE AT THIS TIME
TOTAL UP NUMBER OF TIMES UPPER LIMIT OF NUMBER OF CRAFT AND FACILITIES IS REACHED
SET PARAMETERS FOR QUEUE
RETURN

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SUBROUTINE AVRAGE     74/74   OPT=0 ROUND=*/ TRACE          FTN 4.8+588        07/23/81  09.54.22        PAGE     1

                      SUBROUTINE AVRAGE                                                    AVRAGE      2
                      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)       AVRAGE      3
                     1 ,ACJCGO(8),NTEST ,LDCRF(4),MTEST,TIMSAV ,ICRF(4)                    AVRAGE      4
                      COMMON/A/XCARGO(9),YCARGO(40,9),IDSCGO(40,2),ZCARG((9),TCARGO,       AVRAGE      5
                     1COFFSH,KQUEUE(50),KQUEUE(50),QTIME(5),MQUE(5)                        AVRAGE      6
                      COMMON/B/KELCFT,KBSFAC,KCJUC,KCCF,KCSFAC,KCTRK,KCUP,IAVRGE           AVRAGE      7
                      COMMON                                                               AVRAGE      8
                     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,        AVRAGE      9
                     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                          AVRAGE     10
                     1/CARGOG/ NCARGA,KARGEN(1000,3),CARGEN(1000)                          AVRAGE     11
                     2, JCARGO(1000,3),CARGO(1000),NSCGO                                   AVRAGE     12
                     1/SHIP/NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,18),ITIN(16,10)          AVRAGE     13
                     1/PORT/NPORT(30,6),IFAC(30,10)                                        AVRAGE     14
                     2,IQUEUE(1000,2),NQUEUE                                               AVRAGE     15
                     1/PLT/XAX(110),KY(110,7),IPLT                                         AVRAGE     16
                      COMMON/WATE/ITCFT(4,2),XTCFT(4,2),ISUFAC(2,2),XSUFAC(2),IUP(2),XUP   AVRAGE     17
                     1,KTCFT(4),KSUFAC(2),KUP,NTCFT,NSUFAC,IUPCFT(4),IUPSUF(2),IUPUP       AVRAGE     18
                     2,INKPTE                                                              AVRAGE     19
                C     INCREASE COUNTER INDICATING HOW MANY TIMES SUBROUTINE AVRAGE HAS B    AVRAGE     20
                C      CALLED SINCE THE LAST SYSTEM STATUS SUMMARY PRINTOUT                 AVRAGE     21
                      IAVRGE=IAVRGE+1                                                      AVRAGE     22
                C     ADD NUMBER OF EACH TYPE OF TRANSPORT CRAFT OR FACILITY BEING USED    AVRAGE     23
                C      THIS TIME                                                           AVRAGE     24
                      DO 10 I=1,NTCFT                                                      AVRAGE     25
                   10 KTCFT(I)=KTCFT(I)+ITCFT(I,2)                                         AVRAGE     26
                      DO 20 I=1,NSUFAC                                                     AVRAGE     27
                   20 KSUFAC(I)=KSUFAC(I)+ISUFAC(I,2)                                      AVRAGE     28
                      KUP=KUP+IUP(2)                                                       AVRAGE     29
                C     STORE CRAFT AND FACILITIES USAGE DATA IN PREPARATION FOR WRITEOUT     AVRAGE     30
                      IF(NTEST.GT.0) GO TO 300                                             AVRAGE     31
                      DO 200 I=1,4                                                         AVRAGE     32
                  200 ICRF(I)=MAX0(ICRF(I),ITCFT(I,2))                                    AVRAGE     33
                  300 CONTINUE                                                             AVRAGE     34
                      IPLT=IPLT+1                                                          AVRAGE     35
                      XAX(IPLT)=TIME                                                       AVRAGE     36
                      KY(IPLT,1)=ITCFT(1,2)                                                AVRAGE     37
                      KY(IPLT,2)=ITCFT(2,2)                                                AVRAGE     38
                      KY(IPLT,3)=ITCFT(3,2)                                                AVRAGE     39
                      KY(IPLT,4)=ITCFT(4,2)                                                AVRAGE     40
                      KY(IPLT,5)=ISUFAC(1,2)                                               AVRAGE     41
                      KY(IPLT,6)=ISUFAC(2,2)                                               AVRAGE     42
                      KY(IPLT,7)=IUP(2)                                                    AVRAGE     43
                      IF(IOUT.GT.1) GO TO 111                                              AVRAGE     44
                C     PRINT NUMBER OF TRANSFER CRAFT AND FACILITIES IN USE AT THIS TIME    AVRAGE     45
                      PRINT 100, TIME,ITCFT(1,2),ITCFT(2,2),ITCFT(3,2),ITCFT(4,2),         AVRAGE     46
                     1ISUFAC(1,2),ISUFAC(2,2),IUP(2)                                       AVRAGE     47
                  100 FORMAT(5X,F9.3,10X,7I10)                                             AVRAGE     48
                C     TOTAL UP NUMBER OF TIMES UPPER LIMIT OF NUMBER OF CRAFT AND FACILI   AVRAGE     49
                C      IS REACHED                                                          AVRAGE     50
                  111 DO 110 I=1,NTCFT                                                     AVRAGE     51
                  110 IF(ITCFT(I,2).EQ.ITCFT(I,1)) IUPCFT(I)=IUPCFT(I)+1                   AVRAGE     52
                      DO 120 I=1,NSUFAC                                                    AVRAGE     53
                  120 IF(ISUFAC(I,2).EQ.ISUFAC(I,1)) IUPSUF(I)=IUPSUF(I)+1               AVRAGE     54
                      IF(IUP(2).EQ.IUP(1)) IUPUP=IUPUP+1                                   AVRAGE     55
                C     SET PARAMETERS FOR QUEUE                                             AVRAGE     56
                      TEVENT=TIME+0.1                                                      AVRAGE     57
                      LVENT1=1C                                                            AVRAGE     58

SUBROUTINE AVRAGE     74/74   OPT=0 ROUND=*/ TRACE          FTN 4.8+508        07/23/81  09.54.22        PAGE     2

                      CALL PUT                                                             AVRAGE     59
                      RETURN                                                               AVRAGE     60
                      END                                                                  AVRAGE     61
```

DISTRI (TYPE, PAR1, PAR2, RESULT)

Activity Performed: Computes a value, RESULT, derived from a specified distribution curve.

Type: Subroutine

Common Used: /GEN/

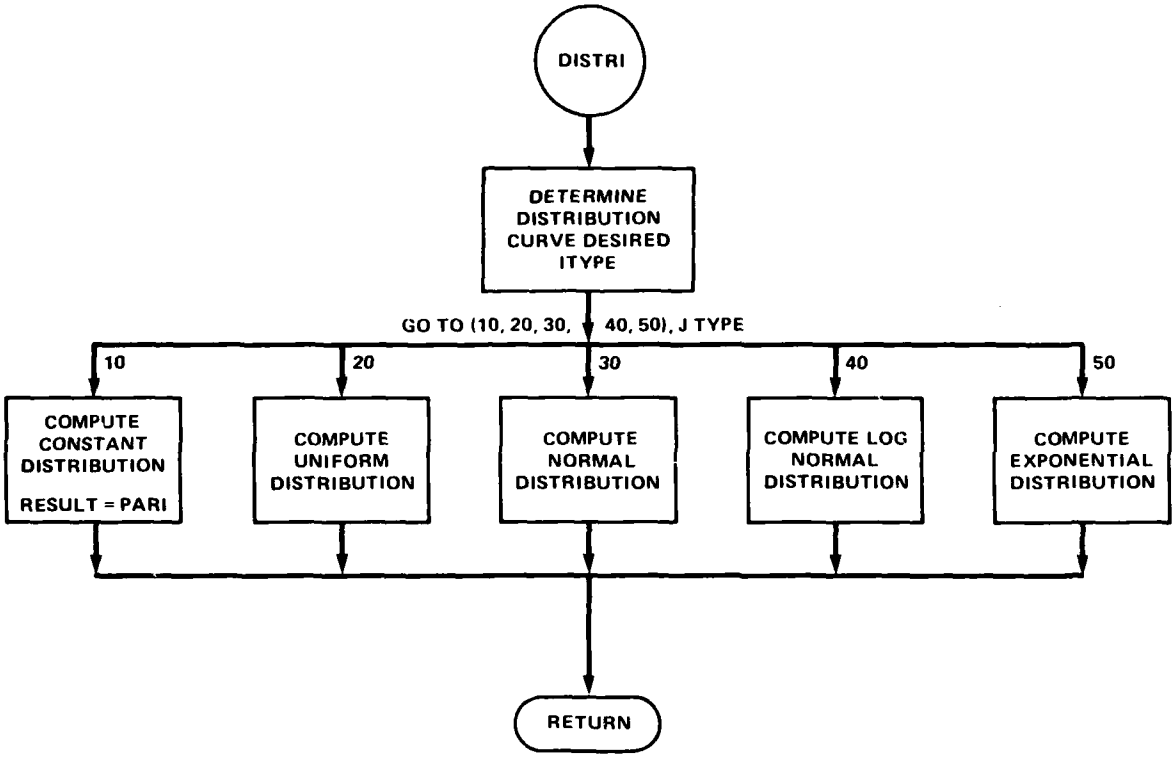
Called by: GENCAR

Event Stored: none

Description:

DISTRI uses the variance information given by DISTRI's calling event to compute a value derived from a specified distribution curve. The following distributions are considered by DISTRI:

Distribution Type	Parameter 1	Parameter 2	Random Variable
Constant	Fixed value	Not used	Parameter 1
Uniform	Upper limit	Lower limit	Parameter 2 + RN* (parameter 1 - parameter 2) where RN is a random number between zero and one.
Normal	Mean	Standard deviation	


DISTRI
DETERMINE DISTRIBUTION CURVE DESIRED ITYPE
GO TO (10, 20, 30, 40, 50), J TYPE
10
20
30
40
50
COMPUTE CONSTANT DISTRIBUTION
RESULT = PARI
COMPUTE UNIFORM DISTRIBUTION
COMPUTE NORMAL DISTRIBUTION
COMPUTE LOG NORMAL DISTRIBUTION
COMPUTE EXPONENTIAL DISTRIBUTION
RETURN

```
      SUBROUTINE DISTRI(ITYPE,PAR1,PAR2,RESULT)                          DISTRI      2
C-----------------------------------------------------------------------  DISTRI      3
C     DISTRI COMPUTES THE THE DEPENDENT VARIABLE ,GIVEN ONE OF THE       DISTRI      4
C     FOLLOWING DISTRIBUTION CURVES.                                     DISTRI      5
C-----------------------------------------------------------------------  DISTRI      6
      COMMON                                                             DISTRI      7
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,      DISTRI      8
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                        RN1110     56
      GO TO (10,20,30,40,50) ,ITYPE                                      DISTRI     10
   10 RESULT=PAR1                                                        DISTRI     11
      RETURN                                                             DISTRI     12
   20 CALL RNG                                                           DISTRI     13
      RESULT=PAR2+RN*(PAR1-PAR2)                                         DISTRI     14
      RETURN                                                             DISTRI     15
   30 SUM=0                                                              DISTRI     16
      DO 100 I=1,12                                                      DISTRI     17
      CALL RNG                                                           DISTRI     18
  100 SUM=SUM+RN                                                         DISTRI     19
      RESULT=PAR1+(SUM-6.)*PAR2                                          DISTRI     20
      IF(RESULT.LT.0.0) RESULT=0.                                        DISTRI     21
      RETURN                                                             DISTRI     22
   40 CALL RNG                                                           DISTRI     23
      SAVE=1./(1-RN)                                                     DISTRI     24
      SAVE=ALOG(SAVE)                                                    DISTRI     25
      RESULT=SAVE/PAR1                                                   DISTRI     26
      RETURN                                                             DISTRI     27
   50 SAVE=1.+(PAR2*PAR2/(PAR1*PAR1))                                    DISTRI     28
      SAVE2=PAR1/SQRT(SAVE)                                              DISTRI     29
      XMU=ALOG(SAVE2)                                                    DISTRI     30
      VARSQR=ALOG(SAVE)                                                  DISTRI     31
      SUM=0                                                              DISTRI     32
      DO 200 I=1,12                                                      DISTRI     33
      CALL RNG                                                           DISTRI     34
  200 SUM=SUM+RN                                                         DISTRI     35
      RESULT=EXP(XMU+(SUM-6.)*SQRT(VARSQR))                              DISTRI     36
      RETURN                                                             DISTRI     37
      END                                                                DISTRI     38
```

FORDER (IARRAY, NUM, INDEX, XRRAY, IPTR)

Activity Performed: Updates an array by eliminating non-essential entries

Type: Subroutine

Common Used: none

Called by: SPOOL

Events Stored: none

Description:

FORDER eliminates all unused locations of a given array amd adjusts the item entry counter.

GENCAR

Activity Performed: Initializes all cargo scheduled to enter a port for overseas delivery.

Type: Event

Common Used: /CARGOG/, /GEN/, /SUMY/

Called by: TAKE

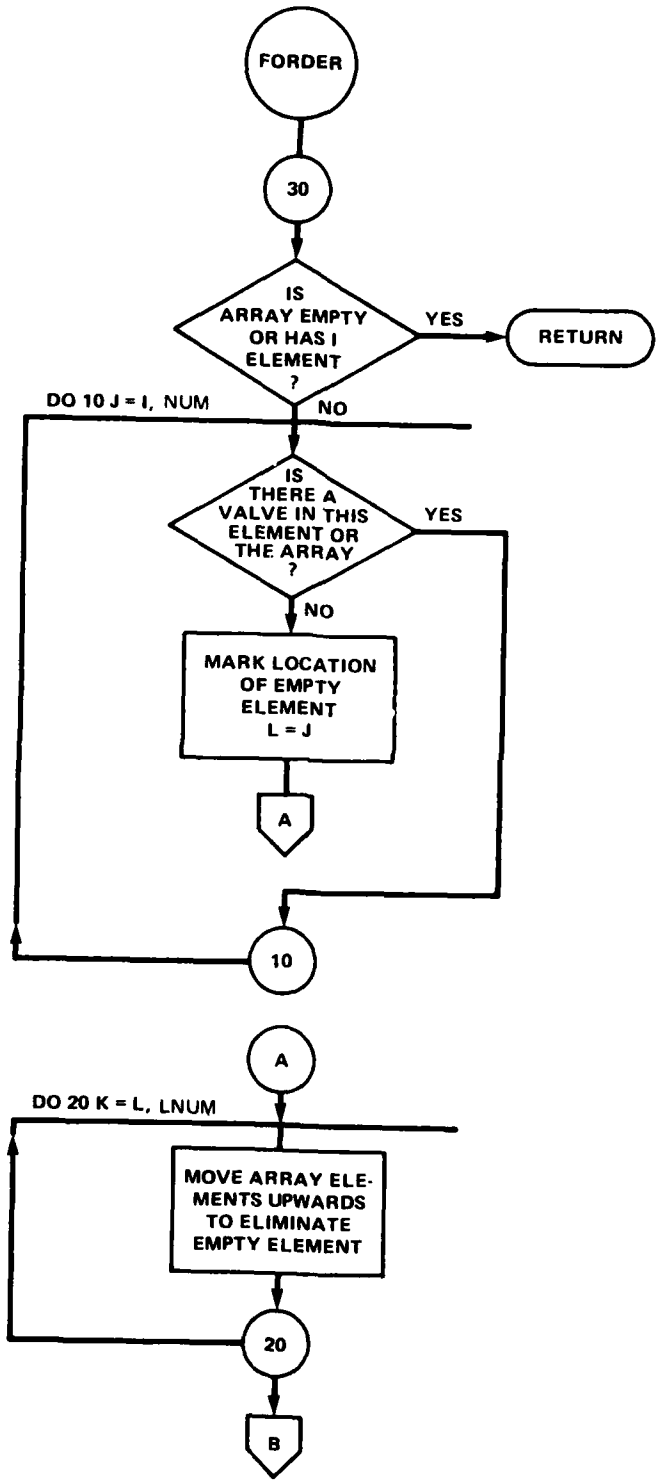
Stored by: GENCAR, RDPARM

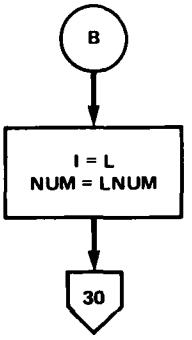
Subroutines Called: DISTRI, PUT

Events Stored: GENCAR

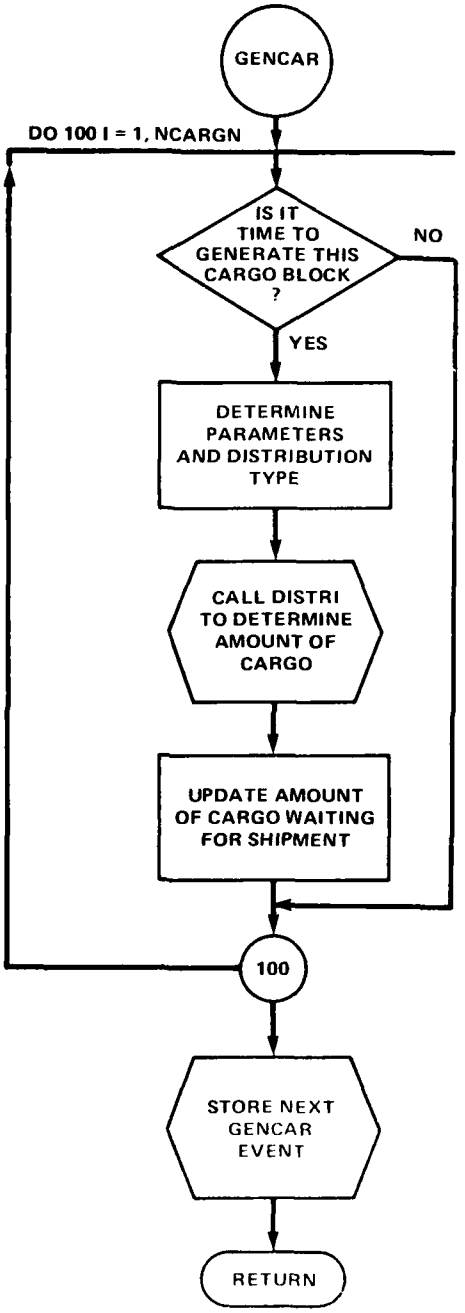
Description:

GENCAR generates, on a day-by-day basis, cargo scheduled to enter a port for overseas delivery. Input specifies cargo type to be generated, origin, destination, and quantity variance information. Each cargo generation specifies a time interval between generations.


FORDER
30
IS ARRAY EMPTY OR HAS I ELEMENT ?
YES
RETURN
NO
DO 10 J = I, NUM
IS THERE A VALVE IN THIS ELEMENT OR THE ARRAY ?
YES
NO
MARK LOCATION OF EMPTY ELEMENT L = J
A
10
A
DO 20 K = L, LNUM
MOVE ARRAY ELEMENTS UPWARDS TO ELIMINATE EMPTY ELEMENT
20
B


B
I = L
NUM = LNUM
30

```
      SUBROUTINE FORDER(IARRAY,NUM,IDEX,XRRAY,IPTR)                    PF0424    17
      DIMENSION IARRAY(1000,3),XRRAY(1000)                             PF0424    18
      I=1                                                              FORDER     4
   30 IF(NUM.LE.1) RETURN                                              FORDER     5
      DO 10 J=1,NUM                                                    FORDER     6
      IF(IARRAY(J,1).NE.0) GO TO 10                                    FORDER     7
      LNUM=NUM-1                                                       FORDER     8
      L=J                                                              FORDER     9
      GO TO 40                                                         FORDER    10
   10 CONTINUE                                                         FORDER    11
      RETURN                                                           FORDER    12
   40 DO 2. K=L,LNUM                                                   FORDER    13
      IF(IPTR.EQ.1) XRRAY(K)=XRRAY(K+1)                                PF0424    19
      DO 2L KK=1,IDEX                                                  FORDER    14
   20 IARRAY(K,KK)=IARRAY(K+1,KK)                                      FORDER    15
      I=L                                                              FORDER    16
      NUM=LNUM                                                         FORDER    17
      GO TO 30                                                         FORDER    18
      END                                                              FORDER    19
```


GENCAR
DO 100 I = 1, NCARGN
IS IT TIME TO GENERATE THIS CARGO BLOCK ?
NO
YES
DETERMINE PARAMETERS AND DISTRIBUTION TYPE
CALL DISTRI TO DETERMINE AMOUNT OF CARGO
UPDATE AMOUNT OF CARGO WAITING FOR SHIPMENT
100
STORE NEXT GENCAR EVENT
RETURN

```
      SUBROUTINE GENCAR                                                  GENCAR      2
C-----------------------------------------------------------------------  GENCAR      3
C-----------------------------------------------------------------------  GENCAR      4
C     GENCAR GENERATES CARGO AT THE BEGINNING OF EACH SIMULATION DAY      GENCAR      5
C     USING A SPECIFIED CARGO QUANTITY DISTRIBUTION CURVE.               GENCAR      6
C-----------------------------------------------------------------------  GENCAR      7
      COMMON /SUMY/ SUMSHP(30,10),SUMPRT(30,10) ,ISMPRT(30,6)            GENCAR      8
      COMMON                                                             GENCAR      9
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,      GENCAR     10
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                        RN1110     57
     1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                        RN1110     58
     2, JCARGO(1000,3),CARGO(1000),NSCGO                                 GENCAR     13
      DO 100 I=1,NCARGN                                                  GENCAR     14
      IF(FLOAT(MOD(KARGEN(I,3),10**7))*.001.NE.TIME) GO TO 100           RN0619      4
      IF(FLOAT(KARGEN(I,3)/10**7)*.001.LT.TIME) GO TO 100                RN0619      5
      ITYPE=MOD(KARGEN(I,1)/100000,10)                                   RN0619      6
      IF(ITYPE.LE.0) ITYPE=1                                             GENCAR     21
      IDPORT=MOD(KARGEN(I,1)/10  ,100)                                   GENCAR     22
      PAR1=FLOAT(MOD(KARGEN(I,2),10000000))                              GENCAR     23
      PAR2=FLOAT(KARGEN(I,2)/10000000)                                   GENCAR     24
      CALL DISTRI(ITYPE,PAR1,PAR2,VAR)                                   GENCAR     25
      CARGEN(I)=CARGEN(I)+VAR                                            GENCAR     26
      SUMPRT(IDPORT,1)=SUMPRT(IDPORT,1)+VAR                              GENCAR     27
      KARGEN(I,3)=KARGEN(I,3)+KARGEN(I,1)/1000000                        RN0619      7
      IF(IOUT.NE.1) GO TO 100                                            GENCAR     28
      WRITE(6,1000) TIME,IDPORT,I,VAR,CARGEN(I)                          GENCAR     29
 1000 FORMAT(4X,F8.3,5X,I4,14X,                                          GENCAR     30
     1                    *CARGO GENERATION NUMBER = *,                 GENCAR     31
     1I3,*,CARGO GEN =*,F8.2,* MT, TOTAL =*,F10.2,* MT*)                 GENCAR     32
  100 CONTINUE                                                           GENCAR     33
      TEVENT=TIME+1.0                                                    GENCAR     34
      LVENT1=1                                                           GENCAR     35
      LVENT2=0                                                           GENCAR     36
      LVENT3=0                                                           GENCAR     37
      CALL PUT                                                           GENCAR     38
      RETURN                                                             GENCAR     39
      END                                                                GENCAR     40
```

LDSH

Activity Performed: Simulates the loading of cargo.

Type: Event

Common Used: /CARGOG/, /CONTRL/, /GEN/, /PORT/, /SHIP/

Called by: TAKE

Stored by: RLDSH

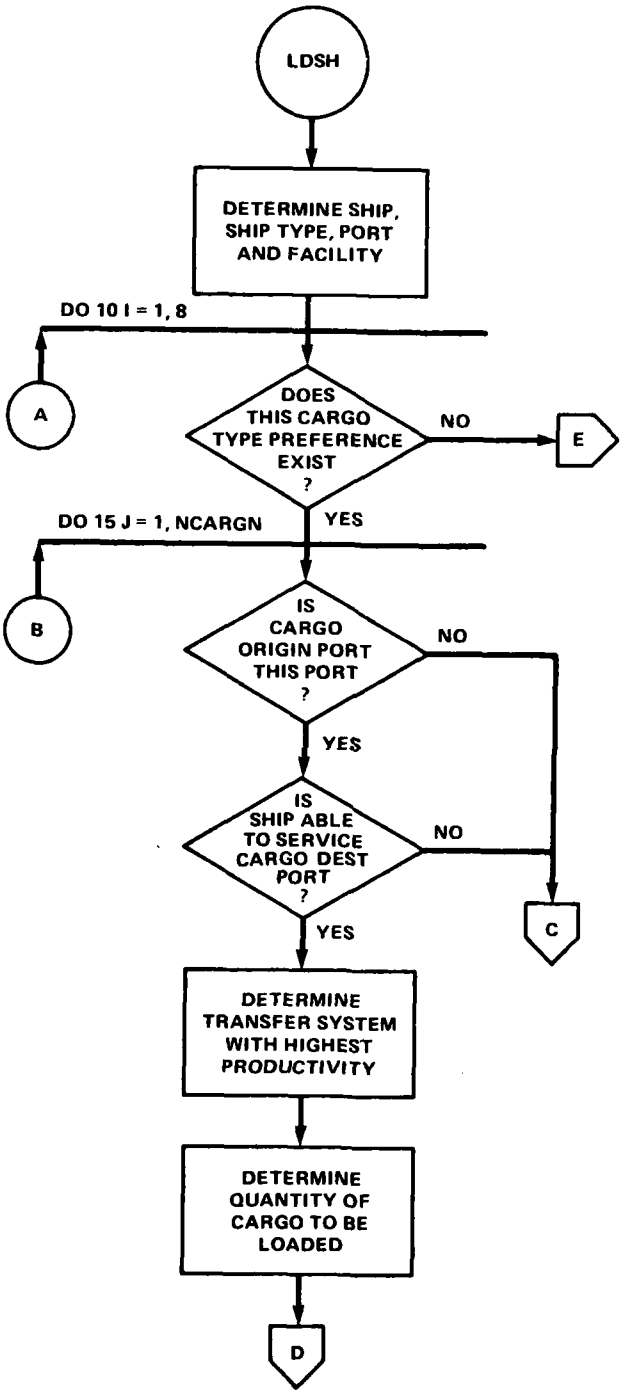
Subroutines Called: PUT, ENDGAM

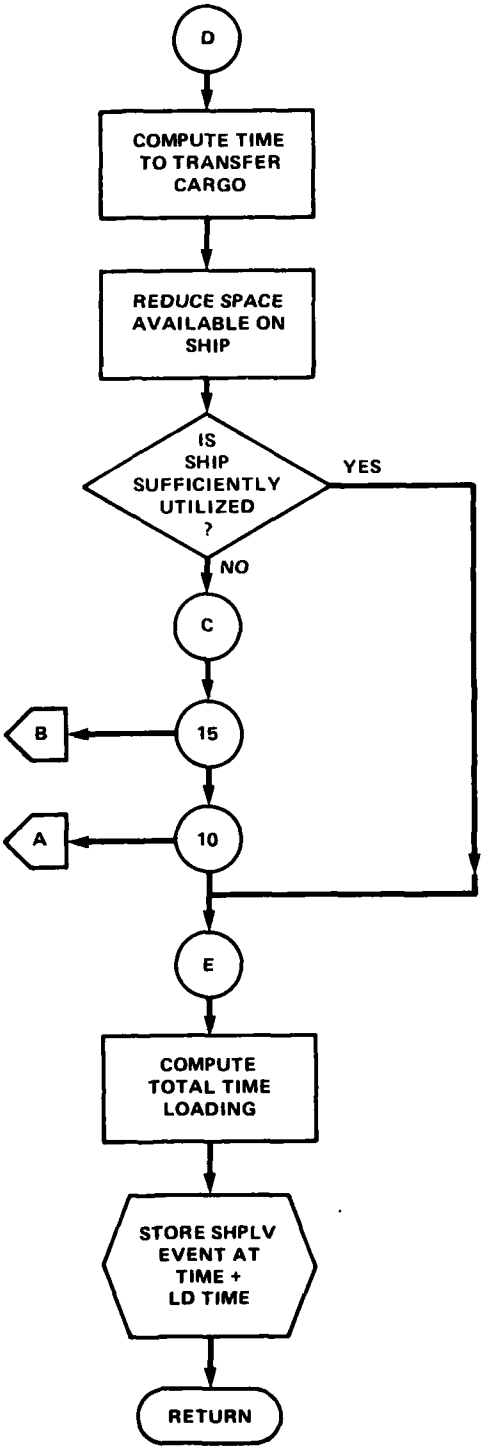
Events Stored: SHPLV

Description:

After the cargo has been unloaded, the simulation of the loading cycle begins. The remaining ports on the ship's schedule are determined and all cargo bound for those ports is loaded aboard the ship.

LDSH specifies the cargo to be loaded and determines the time of loading, using available transfer systems. After loading is complete, LDSH stores a SHPLV event. SHPLV releases facilities no longer needed and repositions the ship at its next service port.


LDSH
DETERMINE SHIP, SHIP TYPE, PORT AND FACILITY
DO 10 I = 1, 8
A
DOES THIS CARGO TYPE PREFERENCE EXIST ?
NO
E
YES
DO 15 J = 1, NCARGN
B
IS CARGO ORIGIN PORT THIS PORT ?
NO
YES
IS SHIP ABLE TO SERVICE CARGO DEST PORT ?
NO
C
YES
DETERMINE TRANSFER SYSTEM WITH HIGHEST PRODUCTIVITY
DETERMINE QUANTITY OF CARGO TO BE LOADED
D


D
COMPUTE TIME TO TRANSFER CARGO
REDUCE SPACE AVAILABLE ON SHIP
IS SHIP SUFFICIENTLY UTILIZED ?
YES
NO
C
B
15
A
10
E
COMPUTE TOTAL TIME LOADING
STORE SHPLV EVENT AT TIME + LD TIME
RETURN

```
      SUBROUTINE LDSH                                                    LDSH      2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)     LDSH      3
     1 ,ADJCGO(8),NTEST                                                  LDSH      4
      COMMON /SUMY/ SUMSHP(30,10),SUMPRT(30,10) ,ISMPRT(30,6)            LDSH      5
      COMMON                                                             LDSH      6
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,      LDSH      7
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                        LDSH      8
     3,IGEN,PUTL                                                         LDSH      9
     1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                        LDSH     10
     2, JCARGO(1000,3),CARGO(1000),NSCGO                                 LDSH     11
     1/SHIP/ NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)       LDSH     12
     1/PORT/NPORT(30,6),IFAC(30,10)                                      LDSH     13
     2,IQUEUE(1000,2),NQUEUE                                             LDSH     14
      IDSHIP=LVENT2                                                      LDSH     15
      IDPORT=LVENT3                                                      LDSH     16
      ITYPE=NSHIP(IDSHIP,1)                                              LDSH     17
      IFAC1=NSHIP(IDSHIP,13)                                             LDSH     18
      IDRAFT=MTSHIP(ITYPE,13)                                            LDSH     19
      IF(IOUT.EQ.1) WRITE(6,1000) TIME,IDPORT,IDSHIP,IFAC1               LDSH     20
 1000 FORMAT(5X,F7.3,5X,I4,5X,I4,5X,*LOAD SHIP AT FACILITY TYPE =*,      LDSH     21
     1I4)                                                                LDSH     22
      SUM=0                                                              LDSH     23
      TEVENT=0                                                           LDSH     24
      DO 10 I=1,8                                                        LDSH     25
      ICT=MTSHIP(ITYPE,I)                                                LDSH     26
      IF(ICT.LE.0) GO TO 20                                              LDSH     27
      IF(NSHIP(IDSHIP,9).LE.0.OR.NSHIP(IDSHIP,10).LE.0) GO TO 20         LDSH     28
       JSAVE=ICT+IDPORT*10                                               LDSH     29
      DO 15 J=1,NCARGN                                                   LDSH     30
      IF(CARGEN(J).LE.0) GO TO 15                                        LDSH     31
       IF(JSAVE.NE.MOD(KARGEN(J,1),1000))  GO TO 15                      LDSH     32
         NXPORT=MOD(KARGEN(J,1)/1000,100)                                LDSH     33
      NITN=NSHIP(IDSHIP,7)                                               LDSH     34
      IF(NITN.LE.0) GO TO 30                                             LDSH     35
      DO 40 II=1,10                                                      LDSH     36
      IF(NXPORT.EQ.ITIN(NITN,II)) GO TO 45                               LDSH     37
   40 CONTINUE                                                           LDSH     38
      GO TO 15                                                           LDSH     39
   30 IF(NPORT(NXPORT,1).EQ.NSHIP(IDSHIP,4).OR.NPORT(NXPORT,1).EQ.       LDSH     40
     1NSHIP(IDSHIP,5)) GO TO 46                                          LDSH     41
      GO TO 15                                                           LDSH     42
   46 IF(IDRAFT.GT.NPORT(NXPORT,3)) GO TO 15                             LDSH     43
   45 XMT=NSHIP(IDSHIP,9)                                                LDSH     44
      IF(NSHIP(IDSHIP,10)*ADJCGO(ICT).LE.XMT)XMT=NSHIP(IDSHIP,10)*ADJCGO LDSH     45
     1(ICT)                                                              LDSH     46
      IF(XMT.GT.CARGEN(J)) XMT=CARGEN(J)                                 LDSH     47
      CARGEN(J)=CARGEN(J)-XMT                                            LDSH     48
      NSHIP(IDSHIP,9)=NSHIP(IDSHIP,9)-XMT                                LDSH     49
      NSHIP(IDSHIP,10)=NSHIP(IDSHIP,10)-(XMT/ADJCGO(ICT))                LDSH     50
       NSCGO=NSCGO+1                                                     LDSH     51
       JCARGO(NSCGO,1)=IDSHIP                                            LDSH     52
      JCARGO(NSCGO,2)=NXPORT                                             LDSH     53
      JCARGO(NSCGO,3)=ICT                                                LDSH     54
      CARGO(NSCGO)=XMT                                                   LDSH     55
      SUMPRT(IDPORT,2)=SUMPRT(IDPORT,2)+XMT                              LDSH     56
      IF(IOUT.EQ.1) WRITE(6,1002) ICT,NXPORT,XMT                         LDSH     57
 1002 FORMAT(35X,*ICT=*,I4,* DEST PORT=*,I4,* MT=*,F10.2)                LDSH     58
```

```
                SUM=SUM+XMT                                                    LOSH      59
                ISAVE=0                                                        LOSH      60
60              SAVE=0                                                         LOSH      61
                DO 35 II=1,6                                                   LOSH      62
                IF(MTSHP2(ITYPE,II).LE.0) GO TO 35                             LOSH      63
                IF(SAVE.GE.PRODUC(IFAC1,II,ICT)) GO TO 35                      LOSH      64
                SAVE=PRODUC(IFAC1,II,ICT)                                      LOSH      65
65              ISAVE=II                                                       LOSH      66
             35 CONTINUE                                                       LOSH      67
                IF(ISAVE.GT.0) GO TO 55                                        LOSH      68
                WRITE(6,1003) IDPORT,IDSHIP                                    LOSH      69
           1003 FORMAT(5X,*ERROR*,I11,I9,5X,*NO TRANSFER DEVICES FOR SERVICE*) LOSH      70
70              GO TO 55                                                       LOSH      71
                CALL ENDGAM                                                    LOSH      72
                STOP                                                           LOSH      73
             55 FACTOR=1.                                                      LOSH      74
                IF(ISAVE.LE.0) GO TO 666                                       LOSH      75
75              IF(MTSHP2(ITYPE,8).GT.1) FACTOR=FLOAT(MTSHP2(ITYPE,8))*.001   LOSH      76
                TEVENT=TEVENT+XMT/(PRODUC(IFAC1,ISAVE,ICT)*FLOAT(NPORT(IDPORT,6)) LOSH   77
               1 *.001*FACTOR)                                                 LOSH      78
            666 CONTINUE                                                       LOSH      79
                IF(NSHIP(IDSHIP,9).LE.0.OR.NSHIP(IDSHIP ,10).LE.0) GO TO 20    LOSH      80
80           15 CONTINUE                                                       LOSH      81
             10 CONTINUE                                                       LOSH      82
             20 SUM=FLOAT(MTSHIP(ITYPE,11)-NSHIP(IDSHIP,9))/FLOAT(MTSHIP(      LOSH      83
               1ITYPE,11))                                                     LOSH      84
                SUM=(SUM-1.0+PUTL)*100.                                        LOSH      85
85              IF(IOUT.EQ.1) WRITE(6,1001) SUM,TEVENT                         LOSH      86
           1001 FORMAT(35X,*VOL PERCNT UTILIZED=*,F10.2,* TIME TO LOAD*,F7.3) LOSH      87
                TEVENT=TEVENT+TIME                                             LOSH      88
                IF(NSHIP(IDSHIP,14).EQ.1) GO TO 25                             LOSH      89
                IF(NSHIP(IDSHIP,9).LE.0.OR.NSHIP(IDSHIP,10).LE.0) GO TO 26     LOSH      90
90              IF(IGEN.NE.1) GO TO 54                                         LOSH      91
                DO 50 I=1,NCARGN                                               LOSH      92
                IF(MOD(KARGEN(I,1)/10,100).NE.IDPORT) GO TO 50                 LOSH      93
                IF(TIME.GT.FLOAT(KARGEN(I,3)/10**7)*.001)GO TO 50              LOSH      94
                XTIM=FLOAT(KARGEN(I,1)/10**6)*.001-FLOAT(MOD(KARGEN(I,3),10**7)) LOSH    95
95             1*.001                                                          LOSH      96
                IF(FLOAT(MOD(KARGEN(I,3),10**7))*.001.GT.TIME)                 LOSH      97
               1 XTIM=FLOAT(MOD(KARGEN(I,3),10**7))*.001-TIME                  LOSH      98
                IF(XTIM.GT.1.5) GO TO 50                                       LOSH      99
                ICT=MOD(KARGEN(I,1),10)                                        LOSH     100
100             DO 53 J=1,5                                                    LOSH     101
                IF(ICT.EQ.MTSHIP(ITYPE,J)) GO TO 52                            LOSH     102
             53 CONTINUE                                                       LOSH     103
                GO TO 50                                                       LOSH     104
             52 TEVENT=TEVENT+XTIM                                             LOSH     105
105             GO TO 54                                                       LOSH     106
             50 CONTINUE                                                       LOSH     107
             54 NSHIP(IDSHIP,14)=1                                             LOSH     108
                TEVENT=TEVENT+FLOAT(NPORT(IDPORT,2))*.01                       LOSH     109
                CALL PUT                                                       LOSH     110
110             RETURN                                                         LOSH     111
             26 TEVENT=TEVENT+FLOAT(NPORT(IDPORT,2))*.01                       LOSH     112
             25 LVENT1=5                                                       LOSH     113
                LVENT2=IDSHIP                                                  LOSH     114
                LVENT3=IDPORT                                                  LOSH     115

115          100 CALL PUT                                                      LOSH     116
                RETURN                                                         LOSH     117
                END                                                            LOSH     118
```

NXPRT(IDSHIP, IDPORT, NXPORT)

Activity Performed: Determines next port to be visited by non-itinerary ship.

Type: Subroutine

Called by: SHPARV,SHPLV

Common Used: /GEN/, /CARGOG/, /SHIP/, /PORT/

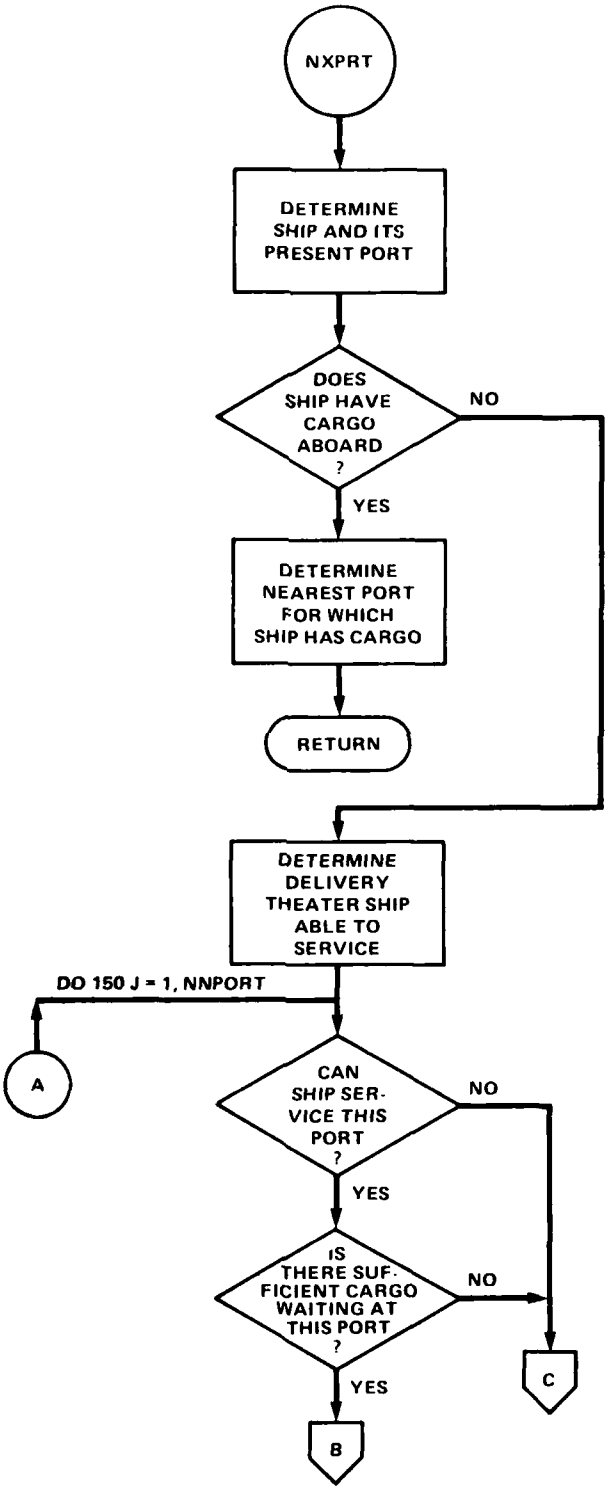
Stored by: n/a

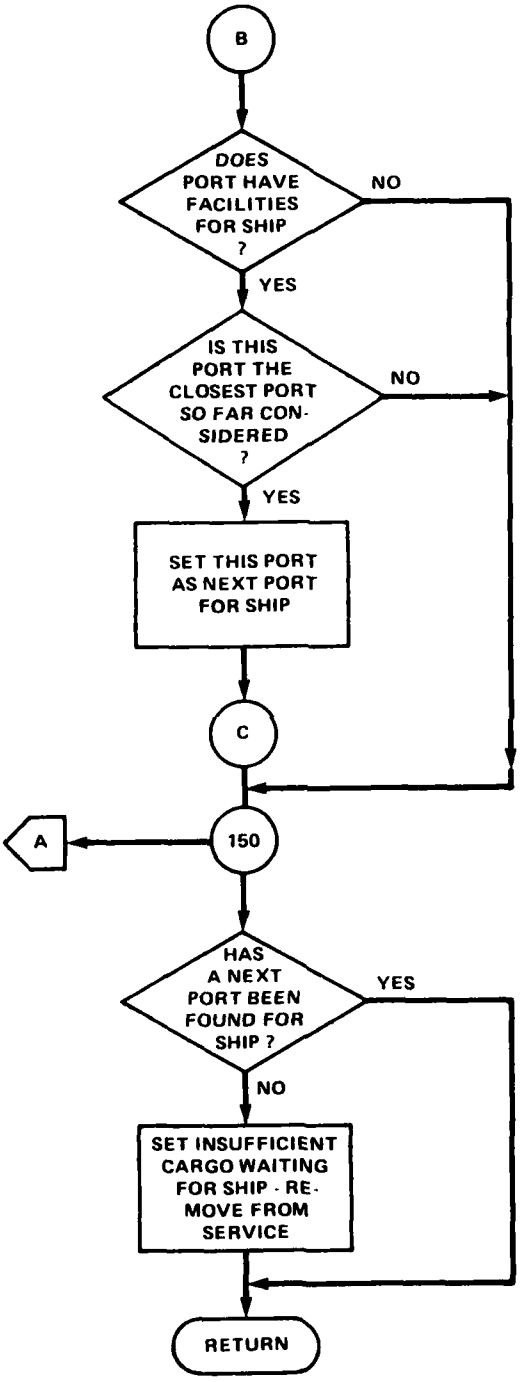
Subroutines Called: none

Events Stored: none

Description:

NXPRT determines the next port to be serviced by a non-itinerary ship. Only ports which can physically receive the ship are considered. Selection is made with respect to quantity of cargo waiting at the port, quantity of cargo aboard ship to be delivered, and transit time between ship's present port and destination port.


NXPRT
DETERMINE SHIP AND ITS PRESENT PORT
DOES SHIP HAVE CARGO ABOARD ?
NO
YES
DETERMINE NEAREST PORT FOR WHICH SHIP HAS CARGO
RETURN
DETERMINE DELIVERY THEATER SHIP ABLE TO SERVICE
DO 150 J = 1, NNPORT
A
CAN SHIP SERVICE THIS PORT ?
NO
YES
IS THERE SUFFICIENT CARGO WAITING AT THIS PORT ?
NO
YES
C
B


B
DOES PORT HAVE FACILITIES FOR SHIP ?
NO
YES
IS THIS PORT THE CLOSEST PORT SO FAR CONSIDERED ?
NO
YES
SET THIS PORT AS NEXT PORT FOR SHIP
C
A
150
HAS A NEXT PORT BEEN FOUND FOR SHIP ?
YES
NO
SET INSUFFICIENT CARGO WAITING FOR SHIP - REMOVE FROM SERVICE
RETURN

```
      SUBROUTINE NXPRT(IDSHIP,IDPORT,NXPORT)                            NXPRT      2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    NXPRT      3
     1 ,ADJCGO(8),NTEST                                                 NXPRT      4
      COMMON                                                            NXPRT      5
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     NXPRT      6
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       NXPRT      7
     1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                       NXPRT      8
     2,JCARGC(1000,3),CARGO(1000),NSCGO,CARGC(2)                        NXPRT      9
     1/SHIP/ NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)      NXPRT     10
     1/PORT/NPORT(30,6),IFAC(30,10)                                     NXPRT     11
     3,IQUEUE(1000,2),NQUEUE,NSE(30,30)                                 NXPRT     12
      DIMENSION NXPT(50)                                                NXPRT     13
      ITYPE=NSHIP(IDSHIP,1)                                             NXPRT     14
      IDRAFT=MTSHIP(ITYPE,13)                                           NXPRT     15
      IFAC1=MTSHIP(ITYPE,9)                                             NXPRT     16
      IFAC2=MTSHIP(ITYPE,10)                                            NXPRT     17
      IORIG=NPORT(IDPORT,1)                                             NXPRT     18
      IF(IORIG.NE.NSHIP(IDSHIP,4)) GO TO 10                             NXPRT     19
      IDELY=NSHIP(IDSHIP,5)                                             NXPRT     20
      GO TO  15                                                         NXPRT     21
   10 IDELY=NSHIP(IDSHIP,4)                                             NXPRT     22
   15 JTHEA=IORIG                                                       NXPRT     23
      NTHEA=IDELY                                                       NXPRT     24
  165 JDIST=99999                                                       NXPRT     25
      NXPORT=0                                                          NXPRT     26
      DO 140 I=1,NSCGO                                                  NXPRT     27
       IF(CARGO(I).LE.0) GO TO 140                                      NXPRT     28
      IF(JCARGO(I,1).NE.IDSHIP) GO TO 140                               NXPRT     29
      NXP=JCARGO(I,2)                                                   NXPRT     30
      IF(NPORT(NXP,1).NE.JTHEA) GO TO 140                               NXPRT     31
      LDIST=XDIST(IDPORT,NXP)                                           NXPRT     32
      IF(LDIST.GE.JDIST) GO TO 140                                      NXPRT     33
      JDIST=LDIST                                                       NXPRT     34
      NXPORT=NXP                                                        NXPRT     35
  140 CONTINUE                                                          NXPRT     36
      IF(NXPORT.GT.0) RETURN                                            NXPRT     37
      IF(NSHIP(IDSHIP,9).LE.0.OR.NSHIP(IDSHIP,10).LE.0) GO TO 171       NXPRT     38
      GO TO 172                                                         NXPRT     39
  171 JTHEA=IDELY                                                       NXPRT     40
      NTHEA=IORIG                                                       NXPRT     41
      GO TO 165                                                         NXPRT     42
  172 DO 150 I=1,NNPORT                                                 NXPRT     43
      NXPT(I)=0                                                         NXPRT     44
       IF(I.EQ.IDPORT) GO TO 150                                        NXPRT     45
      IF(NPORT(I,1).NE.JTHEA) GO TO 150                                 NXPRT     46
      IF(IDRAFT.GT.NPORT(I,3)) GO TO 150                                NXPRT     47
      IF(NPORT(I,5).EQ.1) GO TO 161                                     NXPRT     48
      IF(IFAC(I,IFAC1).GT.0) GO TO 161                                  NXPRT     49
      IF(IFAC2.LE.0) GO TO 150                                          NXPRT     50
      IF(IFAC(I,IFAC2).LE.0) GO TO 150                                  NXPRT     51
  161 DO 160 J=1,8                                                      NXPRT     52
      ICT=MTSHIP(ITYPE,J)                                               NXPRT     53
      IF(ICT.LE.0) GO TO 150                                            NXPRT     54
      ISAVE=ICT*I*10                                                    NXPRT     55
      DO 170 K=1,NCARGN                                                 NXPRT     56
      IF(CARGEN(K).LE.0) GO TO 170                                      NXPRT     57
      IF(MOD(KARGEN(K,1),1000).NE.ISAVE) GO TO 170                      NXPRT     58
```

```
                      NXP=MOD(KARGEN(K,1)/10)C,100)                          NXPRT      59
                      IF(NPORT(NXP,1).NE.NTHEA) GO TO 170                    NXPRT      60
60                    IF(NPORT(NXP,3).LT.IDRAFT) GO TO 170                   NXPRT      61
                      IF(NPORT(NXP,5).EQ.1) GO TO 162                        NXPRT      62
                      IF(IFAC(NXP,IFAC1).GT.0) GO TO 162                     NXPRT      63
                      IF(IFAC2.LE.0) GO TO 170                               NXPRT      64
                      IF(IFAC(NXP,IFAC2).LE.0) GO TO 170                     NXPRT      65
65                162 NXPT(I)=NXPT(I)+CARGEN(K)                              NXPRT      66
                  170 CONTINUE                                               NXPRT      67
                  160 CONTINUE                                               NXPRT      68
                  150 CONTINUE                                               NXPRT      69
                      IF(NTHEA.NE.IORIG) GO TO 151                           NXPRT      70
70                    NXPORT=NSHIP(IDSHIP,3)                                 NXPRT      71
                      IF(NXPT(NXPORT).GE.CARGO(2)) RETURN                    NXPRT      72
                  151 JDIST=0                                                NXPRT      73
                      YDIST=0                                                NXPRT      74
                      DO 180 I=1,NNPORT                                      NXPRT      75
75                    IF(I.EQ.IDPORT) GO TO 180                              NXPRT      76
                      IF(NXPT(I).LT.CARGO(2)) GO TO 180                      NXPRT      77
                      SUM=0                                                  NXPRT      78
                      DO 65 J=1,NSTYP                                        NXPRT      79
                   65 SUM=SUM+FLOAT(MTSHIP(J,11))*FLOAT(NSE(J,I))            NXPRT      80
80                    IF(NXPT(I)-SUM.LT.CARGO(2)) GO TO 180                  NXPRT      81
                      PPM=9999.                                              NXPRT      82
                      IF(XDIST(IDPORT,I).LE.0.0) GO TO 181                   NXPRT      83
                      PPM=FLOAT(NXPT(I))/XDIST(IDPORT,I)                     NXPRT      84
                      IF(YDIST.GE.PPM) GO TO 180                             NXPRT      85
85                181 JDIST=I                                                NXPRT      86
                      YDIST=PPM                                              NXPRT      87
                  180 CONTINUE                                               NXPRT      88
                      NXPORT=JDIST                                           NXPRT      89
                      IF(NXPORT.GT.0) RETURN                                 NXPRT      90
90                    IF(JTHEA.EQ.IDELY) RETURN                              NXPRT      91
                      JTHEA=IDELY                                            NXPRT      92
                      NTHEA=IORIG                                            NXPRT      93
                      GO TO 165                                              NXPRT      94
                      END                                                    NXPRT      95
```

PRNTR

Activity Performed: Prints the output generated by the simulation.

Type: Event

Common Used: /CONTRL/, /SUMY/, /DONNA/, /A/, /B/, /GEN/, /CARGOG/, /SHIP/, /PORT/, /PLT/, WATE/, /BUSH1/, /BUSH2/

Called by: TAKE

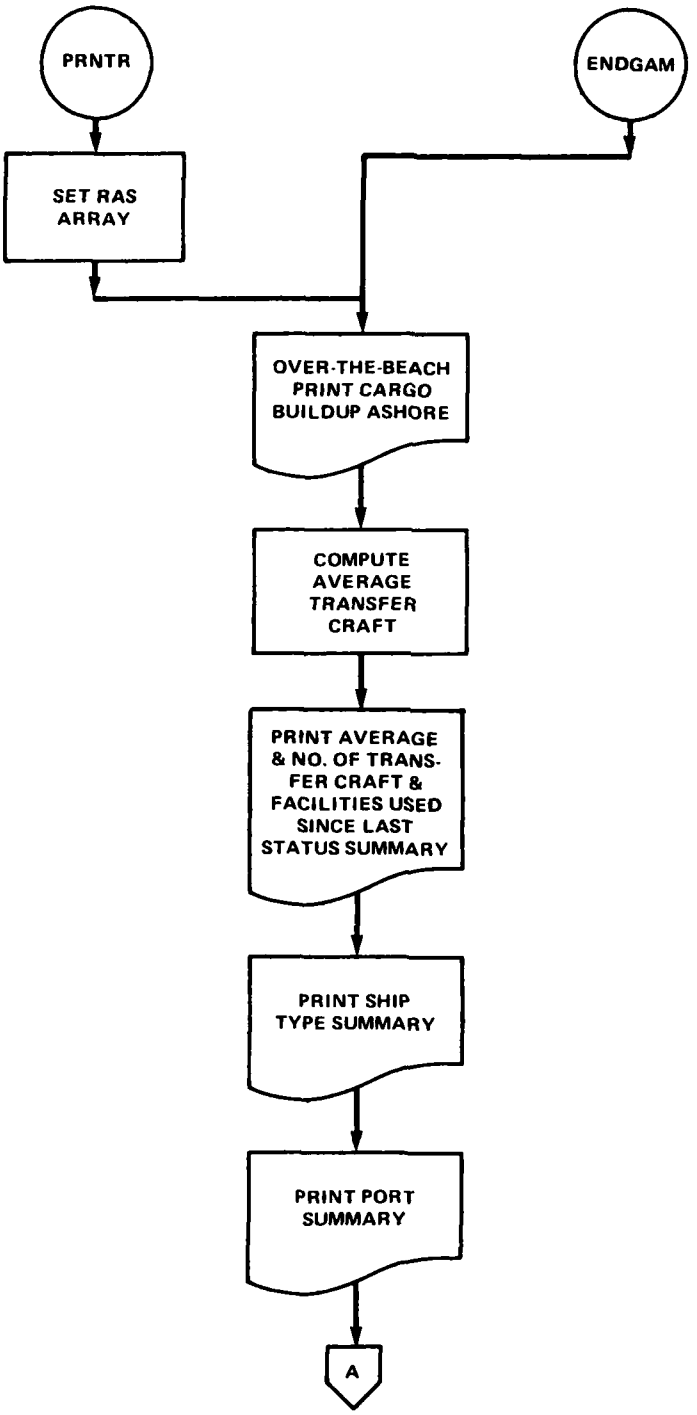
Stored by: RDPARM

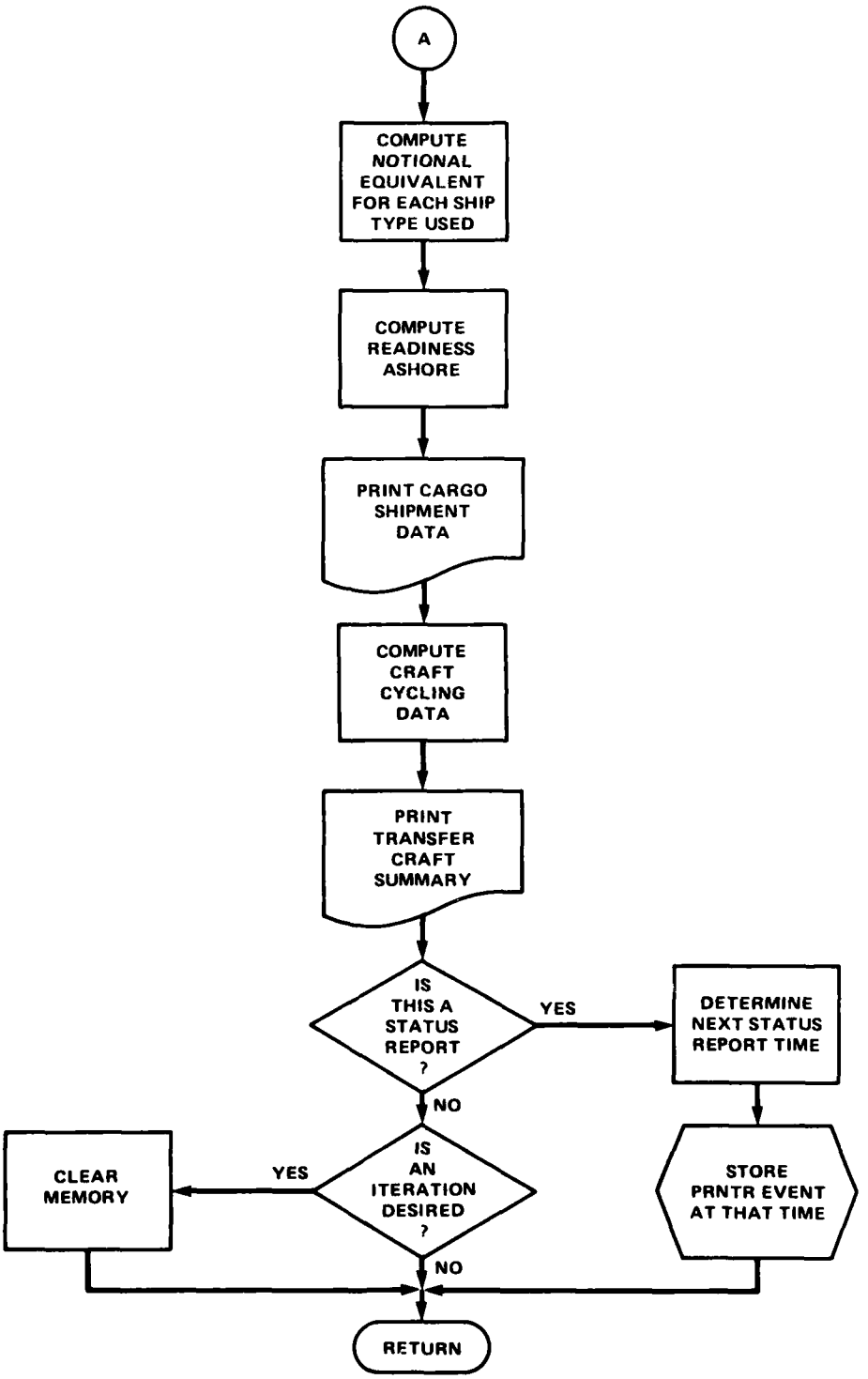
Subroutines Called: n/a

Events Stored: PRNTR

Description:

PRNTR controls the printing of all output generated by the simulation except the numbers of transport craft and unloading facilities currently in use, which are printed by AVRAGE.


PRNTR
ENDGAM
SET RAS ARRAY
OVER-THE-BEACH PRINT CARGO BUILDUP ASHORE
COMPUTE AVERAGE TRANSFER CRAFT
PRINT AVERAGE & NO. OF TRANS-FER CRAFT & FACILITIES USED SINCE LAST STATUS SUMMARY
PRINT SHIP TYPE SUMMARY
PRINT PORT SUMMARY
A


A
COMPUTE NOTIONAL EQUIVALENT FOR EACH SHIP TYPE USED
COMPUTE READINESS ASHORE
PRINT CARGO SHIPMENT DATA
COMPUTE CRAFT CYCLING DATA
PRINT TRANSFER CRAFT SUMMARY
IS THIS A STATUS REPORT ?
YES
DETERMINE NEXT STATUS REPORT TIME
NO
IS AN ITERATION DESIRED ?
YES
CLEAR MEMORY
STORE PRNTR EVENT AT THAT TIME
NO
RETURN

```
      SUBROUTINE PRNTR                                                  PRNTR      2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    PRNTR      3
     1 ,ADJCGO(8),NTEST ,LDCRF(4),MTEST,TIMSAV ,ICRF(4)  ,SHTFLM        PRNTR      4
     1,KX,TBT,KTBT                                                      PRNTR      5
      COMMON /SUMY/ SUMSHP(30,10),SUMPRT(30,10) ,ISMPRT(30,6)           PRNTR      6
     1,NSD,ISD(50,3),UTM(50),PERC1(50),IAVAL(50)                        PRNTR      7
     1/DONNA/ IDR,IDR2,IMD,IDRS,IDAFOE,IDADMN,ND                        PRNTR      8
      COMMON/A/XCARGO(9),YCARGO(40,9),IDSCGO(40,2),ZCARGO(9),TCARGO,    PRNTR      9
     1DOFFSH,KQUEUE(50),XQUEUE(50),QTIME(5),MQUE(5)                     PRNTR     10
      COMMON/B/KBLCFT,KBSFAC,KCJUC,KCCF,KCSFAC,KCTRK,KCUP,IAVRGE        PRNTR     11
      COMMON                                                            PRNTR     12
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     PRNTR     13
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       PRNTR     14
     1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                       PRNTR     15
     2, JCARGO(1000,3),CARGO(1000),NSCGO                                PRNTR     16
     1/SHIP/NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)       PRNTR     17
     1/PORT/NPORT(30,6),IFAC(30,10)                                     PRNTR     18
     3,INQUEUE(1000,2),NQUEUE,NSE(30,30)                               PRNTR     19
     1/PLT/ XAX(110),KY(110,7),IPLT,AA                                  PRNTR     20
      COMMON/WATE/ITCFT(4,2),XTCFT(4,2),ISUFAC(2,2),XSUFAC(2),IUP(2),XUP PRNTR     21
     1,KTCFT(4),KSUFAC(2),KUP,NTCFT,NSUFAC,IUPCFT(4),IUPSUF(2),IUPUP    PRNTR     22
     2,TNKPTE                                                           PRNTR     23
      COMMON/BUSH1/OTME(3),UNLTC(4),TTCS(4),ATTCS(4),TUNLTC(4)          PRNTR     24
      COMMON/BUSH2/NMCFT(5),KFNCH,XIS(9),IOPNCH                         PRNTR     25
      DIMENSION TEMP(6),XT(5),SUM(10),YTCFT(4),YSUFAC(2),ZTCFT(4),      PRNTR     26
     1ZSUFAC(2),Y(4),XIDR(9),XDR(9),BLDUP(9)                            PRNTR     27
     1,RIV(50),XSUM(2),JTEMP(4),ISF(50),IEXC(50),RAS(6),KA(8),KB(5)     PRNTR     28
     3,IANSW(2),ITEMP(6),JSUM(2)                                        PRNTR     29
      DATA(XIDR(I),I=1,7)/45.,10.,10.,45.,45.,45.,45./                  PRNTR     30
      DATA(XDR(I),I=1,7)/1604.,1761.,100.,229.,224.,1021.,100./         PRNTR     31
      DATA(KA(I),I=1,8)/633,1037,1263,1408,186698,15390,8805,24195/     PRNTR     32
      DATA(KB(I),I=1,5)/10HBREAK BULK,10HCONTAINER ,10H  RO/RO   ,      PRNTR     33
     110H   LASH   ,10H  TANKER  /                                      PRNTR     34
      DATA IANSW/3HYES,2HNO/                                            PRNTR     35
      RAS(1)=IDR                                                        PRNTR     36
      RAS(2)=IOPOL                                                      PRNTR     37
      RAS(4)=IDR                                                        PRNTR     38
      RAS(5)=IDR                                                        PRNTR     39
      RAS(6)=IDR                                                        PRNTR     40
      IF(TIME.EQ.TINVL) WRITE(6,2000) TIME                              PRNTR     41
 2000 FORMAT(1H1,20X,*CARGO STATUS SUMMARY AT*,F7.3,* DAYS*)            PRNTR     42
      GO TO 10                                                          PRNTR     43
      ENTRY ENDGAM                                                      PRNTR     44
      WRITE(6,2001) TIME                                                PRNTR     45
 2001 FORMAT(1H1,20X,*CARGO FINALSUMMARY AT *,F7.3,* DAYS*)             PRNTR     46
C     PRINT AMOUNT OF CARGO UNLOADED                                    PRNTR     47
   10 IF(TIME.EQ.TINVL.OR.LVENT1.EQ.8) GO TO 6010                       PRNTR     48
      GO TO 6000                                                        PRNTR     49
 6010 DO 11 I=1,NNPORT                                                  PRNTR     50
      IF(NPORT(I,5).EQ.1) GO TO 12                                      PRNTR     51
   11 CONTINUE                                                          PRNTR     52
      GO TO 13                                                          PRNTR     53
   12 DO 180 I=1,9                                                      PRNTR     54
      XI=IDRS                                                           PRNTR     55
C     IF I=2, SET XI = VALUE OF IDRSPOL                                 PRNTR     56
      IF(I.EQ.2) XI=10                                                  PRNTR     57
      IF(I.EQ.3.OR.I.GE.7) GO TO 170                                    PRNTR     58
```

```
                    BLDUPA=XI+(ZCARGO(I)-XIS(I))/XDR(I)-(TIME-45.)                    PRNTR      59
                170 IF(I.EQ.3.OR.I.GE.7) BLDUPA=0.                                    PRNTR      60
60                  BLDUP(I)=BLDUPA                                                   PRNTR      61
                180 CONTINUE                                                          PRNTR      62
                    SUMXIS=XIS(1)+XIS(4)+XIS(5)+XIS(6)                                PRNTR      63
                    TBA=FLOAT(IDRS)+(TCARGO-ZCARGO(2)-ZCARGO(3)-SUMXIS)/3078.-(TIME-45 PRNTR      64
                   1.)                                                                PRNTR      65
65                  IF(KPNCH.NE.1) GO TO 174                                          PRNTR      66
                    IF(TIME.GT.49.5) PUNCH 172, TIME,BLDUP(1),BLDUP(2),BLDUP(4),      PRNTR      67
                   1BLDUP(5),BLDUP(6),TBA,IDPNCH                                      PRNTR      68
                172 FORMAT(7F10.1,A10)                                                PRNTR      69
                174 PRINT 270                                                         PRNTR      70
70              270 FORMAT(1H-,4X,*CARGO*,8X,*AMOUNT CARGO*,9X,*BUILDUP ASHORE*,8X,   PRNTR      71
                   1*REQUIRED ASHORE*,7X,*EXCESS ASHORE*)                             PRNTR      72
                    PRINT 272                                                         PRNTR      73
                272 FORMAT(5X,*TYPE*,7X,*DELIVERED ASHORE*,6X,*(DAYS OF SUPPLY)*,7X,  PRNTR      74
                   1*(DAYS OF SUPPLY)     (DAYS OF SUPPLY)*)                         PRNTR      75
75                  PRINT 274                                                         PRNTR      76
                274 FORMAT(22X,*(MT)*)                                                PRNTR      77
                    AEXASH=0.                                                         PRNTR      78
                    DO 280 I=1,6                                                      PRNTR      79
                    EXASH=BLDUP(I)-RAS(I)                                             PRNTR      80
80                  IF(I.NE.3) AEXASH=AEXASH+EXASH                                    PRNTR      81
                    IF(I.NE.3) PRINT 290, I,ZCARGO(I),BLDUP(I),RAS(I),EXASH           PRNTR      82
                280 IF(I.EQ.3) PRINT 290, I,ZCARGO(I)                                 PRNTR      83
                290 FORMAT(1H0,2X,I5,9X,F11.0,11X,F9.1,15X,F8.1,12X,F9.1)             PRNTR      84
                    PRINT 300                                                         PRNTR      85
85              300 FORMAT(1H-)                                                       PRNTR      86
                    PRINT 302, TCARGO                                                 PRNTR      87
                302 FORMAT(1H-,10X,*TOTAL AMOUNT OF CARGO DELIVERED =*,F10.0,* MT*)   PRNTR      88
                    PRINT 304, TBA                                                    PRNTR      89
                304 FORMAT(1H-,10X,*TOTAL BUILDUP ASHORE (LESS TYPES 2 AND 3) =*,F7.1, PRNTR      90
90                 1* DAYS*)                                                          PRNTR      91
                    IF(TIME.GT.49.5) TBT=TBT+TBA                                      PRNTR      92
                    IF(TIME.GT.49.5) KTBT=KTBT+1                                      PRNTR      93
                    AEXASH=AEXASH/5.                                                  PRNTR      94
                    PRINT 306, AEXASH                                                 PRNTR      95
95              306 FORMAT(1H-,10X,*AVERAGE EXCESS ASHORE (LESS TYPE 3) =*,F7.1,* DAYS PRNTR      96
                   1*)                                                                PRNTR      97
                 58 FORMAT(4I10)                                                      PRNTR      98
                C     COMPUTE AVERAGES FOR NUMBERS OF TRANSFER CRAFT AND FACILITIES USED PRNTR      99
                C      LAST SYSTEM STATUS SUMMARY PRINTOUT                          PRNTR     100
100                 X=IAVRGE                                                        PRNTR     101
                    DO 540 I=1,NTCFT                                                PRNTR     102
                540 YTCFT(I)=KTCFT(I)/X                                             PRNTR     103
                    DO 550 I=1,NSUFAC                                               PRNTR     104
                550 YSUFAC(I)=KSUFAC(I)/X                                           PRNTR     105
105                 YUP=KUP/X                                                       PRNTR     106
                C     COMPUTE FRACTION OF TIMES UPPER LIMIT OF NUMBER OF CRAFT AND FACIL PRNTR     107
                C      IS REACHED                                                   PRNTR     108
                    AA=AA+FLOAT(IPLT)                                               PRNTR     109
                    DO 552 I=1,NTCFT                                                PRNTR     110
110             552 ZTCFT(I)=FLOAT(IUPCFT(I))/AA                                    PRNTR     111
                    DO 554 I=1,NSUFAC                                               PRNTR     112
                554 ZSUFAC(I)=FLOAT(IUPSUF(I))/AA                                   PRNTR     113
                    ZUPUP=FLOAT(IUPUP)/AA                                           PRNTR     114
                C     RESET PARAMETERS                                              PRNTR     115
```

```
115                IAVRGE=0                                                  PRNTR     116
                   DO 560 I=1,NTCFT                                          PRNTR     117
                 560 KTCFT(I)=0                                              PRNTR     118
                   DO 570 I=1,NSUFAC                                         PRNTR     119
                 570 KSUFAC(I)=0                                             PRNTR     120
120                KUP=0                                                     PRNTR     121
               C   PRINT OUT AVERAGES FOR NUMBERS OF TRANSFER CRAFT AND FACILITIES  PRNTR 122
               C    USED SINCE LAST CARGO STATUS SUMMARY PRINTOUT.  ALSO PRINT OUT  PRNTR 123
               C    FRACTION OF TIMES UPPER LIMIT OF NUMBER OF CRAFT AND FACILITIES PRNTR 124
               C    IS REACHED.                                              PRNTR     125
125                PARC=TIME-5.                                              PRNTR     126
                   PRINT 210, PARC,TIME                                      PRNTR     127
                 210 FORMAT(1H1,20X,*TRANSFER CRAFT / MATERIAL HANDLING EQUIPMENT UTILI PRNTR 128
                  1ZATION BETWEEN DAYS*,F7.3,* AND*,F7.3)                    PRNTR     129
                   PRINT 212                                                 PRNTR     130
130                212 FORMAT(1H-,14X,*NAME*,24X,*AVERAGE*,9X,*FRACTION OF TIME*,  PRNTR 131
                   PRINT 214                                                 PRNTR     132
                 214 FORMAT(43X,*NUMBER*,12X,*UPPER LIMIT*)                  PRNTR     133
                   PRINT 216                                                 PRNTR     134
                 216 FORMAT(44X,*USED*,13X,*IS REACHED*)                     PRNTR     135
135                PRINT 218, NMCFT(1),YTCFT(1),ZTCFT(1)                     PRNTR     136
                   PRINT 218, NMCFT(2),YTCFT(2),ZTCFT(2)                     PRNTR     137
                   PRINT 218, NMCFT(3),YTCFT(3),ZTCFT(3)                     PRNTR     138
                 218 FORMAT(1H0,11X,A10,20X,F7.1,13X,F7.3)                   PRNTR     139
                   PRINT 220, YTCFT(4),ZTCFT(4)                              PRNTR     140
140                220 FORMAT(1H0,12X,*PIPELINE*,21X,F7.1,13X,F7.3)          PRNTR     141
                   PRINT 222, YSUFAC(1),ZSUFAC(1)                            PRNTR     142
                 222 FORMAT(1H0,12X,*FORKLIFTS*,20X,F7.1,13X,F7.3)           PRNTR     143
                   PRINT 224, YSUFAC(2),ZSUFAC(2)                            PRNTR     144
                 224 FORMAT(1H0,8X,*SHORESIDE CRANES*,17X,F7.1,13X,F7.3)     PRNTR     145
145                PRINT 226, YUP,ZUPUP                                      PRNTR     146
                 226 FORMAT(1H0,2X,*CONTAINER UNLOADING PLATFORMS*,10X,F7.1,13X,F7.3)  PRNTR 147
               C   COMPUTE AND PRINT MEAN WAITING TIME TO UNLOAD             PRNTR     148
                   DO 500 II=1,5                                             PRNTR     149
                 500 XT(II)=QTIME(II)/NQUE(II)                               PRNTR     150
150                PRINT 300                                                 PRNTR     151
                   PRINT 228                                                 PRNTR     152
                 228 FORMAT(1H-,30X,*SHIP WAITING INFORMATION*)              PRNTR     153
                   PRINT 230                                                 PRNTR     154
                 230 FORMAT(1H-,11X,*SHIP TYPE*,9X,*NUMBER OF SHIPS*,9X,*MEAN WAITING T PRNTR 155
155               1IME*)                                                     PRNTR     156
                   PRINT 232                                                 PRNTR     157
                 232 FORMAT(    32X,*WAITING*,20X,*(DAYS)*)                  PRNTR     158
                   DO 234 II=1,5                                             PRNTR     159
                 234 PRINT 236, KB(II),NQUE(II),XT(II)                       PRNTR     160
160                236 FORMAT(1H0,10X,A10,13X,I5,20X,F7.2)                   PRNTR     161
               C   WRITE NUMBER OF CRAFT AND FACILITIES USED, AS A FUNCTION OF TIME.  PRNTR 162
                   WRITE(30) IPLT                                            PRNTR     163
                   WRITE(30) (XAX(I),I=1,IPLT)                               PRNTR     164
                   DO 530 J=1,7                                              PRNTR     165
165                530 WRITE(30) (KY(I,J),I=1,IPLT)                          PRNTR     166
               C   RESET COUNTER                                             PRNTR     167
                   IPLT=0                                                    PRNTR     168
                   PRINT 999                                                 PRNTR     169
                  13 WRITE(6,1002)                                           PRNTR     170
170               6000 DO 20 I=1,10                                          PRNTR     171
                  20 SUM(I)=0                                               PRNTR     172
```

```
                      NSD=NSD+1                                                  PRN TR     173
                      ISD(NSD,1)=TIME                                            PRN TR     174
                    1002 FORMAT(// 5X,*... S H I P  T Y P E  S U M M A R Y*//     PRNTR      175
175                     15X,*SHIP*,2(3X,*VOLUME MT*,3X,*WEIGHT TON*),3X,*PERCENT*,3X,  PRNTR  176
                        1 3X,                                                    PRN TR     177
                        2*NO. IN*,5X,*NO. IN*/5X,*TYPE*,3X,2(*AVAILABLE*3X),2X,2(*UTILIZED*  PRNTR  178
                        3,3X),2X,*VOL USED*,5X,*POOL*,6X,*SERVICE*)              PRNTR      179
                      DO 410 I=1,NSTYP                                           PRN TR     180
180                   PERC=0                                                     PRNTR      181
                      TIMP=0                                                     PRN TR     182
                      IF(SUMSHP(I,1).GT.0) PERC=SUMSHP(I,3)/SUMSHP(I,1)          PRN TR     183
                      PERC=PERC*100.                                             PRNTR      184
                      DO 15 II=1,6                                               PRN TR     185
185                  15 SUM(II)=SUM(II)+SUMSHP(I,II)                             PRNTR      186
                      UTM(NSD)=SUM(1)                                            PRN TR     187
                      IF(TIME.EQ.TINVL.OR.LVENT1.EQ.8)                           PRN TR     188
                     1 WRITE(6,1003) I,(SUMSHP(I,J),J=1,4),PERC,SUMSHP(I,5),SUMSHP(I,6)  PRN TR  189
                     410 CONTINUE                                                PRNTR      190
190                  1003 FORMAT(5X,I4,10F12.0)                                  PRN TR     191
                      ISD(NSD,3)=SUM(5)                                          PRN TR     192
                      PERC=0                                                     PRNTR      193
                      IF(SUM(1).GT.0) PERC=(SUM(3)/SUM(1))*100.                  PRNTR      194
                      PERC1(NSD)=PERC                                            PRNTR      195
195                   IAVAL(NSD)=SUM(1)                                          PRN TR     196
                      IF(TIME.EQ.TINVL.OR.LVENT1.EQ.8)     WRITE(6,1006)         PRN TR     197
                     1 (SUM(I),I=1,4),PERC,SUM(5),SUM(6)                         PRN TR     198
                    1006 FORMAT(//4X,*TOTAL*,10F12.0)                            PRNTR      199
                      DO 21 K=1,3                                                PRN TR     200
200                  21 SUM(K)=0                                                 PRNTR      201
                      IF(TIME.EQ.TINVL.OR.LVENT1.EQ.8) WRITE(6,1004)             PRN TR     202
                    1004 FORMAT(1H1,4X,*... P O R T  S U M M A R Y*//5X,*PORT*   PRNTR      203
                        2,3(8X,*CARGO*),5X,*QUEUE AT FACILITIES*,9X,*MEAN WAIT*  PRNTR     204
                        3,* TIME (DAYS)*/ 6X,*NO.*,8X,*GENRD*,8X,*SHPPD*,8X,*DELVD*,6X,  PRN TR  205
205                     4*1  2  3  4  5  6*,9X,*1*,4X,*2*,4X,*3*,4X,*4*,4X,*5*,4X,*6*)  PRN TR  206
                      DO 420 I=1,NNPORT                                          PRN TR     207
                      DO 22 K=1,3                                                PRNTR      208
                     22 SUM(K)=SUM(K)+SUMPRT(I,K)                                PRN TR     209
                      ISD(NSD,2)=SUM(3)                                          PRN TR     210
210                   DO 430 J=1,6                                               PRNTR      211
                      TEMP(J)=0                                                  PRN TR     212
                      IF(ISMPRT(I,J).GT.0) TEMP(J)=SUMPRT(I,J+3)/ISMPRT(I,J)     PRN TR     213
                     430 CONTINUE                                                PRN TR     214
                      IF(TIME.EQ.TINVL.OR.LVENT1.EQ.8)                           PRN TR     215
215                   1 WRITE(6,1005) I,(SUMPRT(I,J),J=1,3),(ISMPRT(I,J),J=1,6),TEMP  PRNTR  216
                     420 CONTINUE                                                PRNTR      217
                      IF(TIME.EQ.TINVL.OR.LVENT1.EQ.8)    GO TO 6001             PRNTR      218
                      GO TO 6002                                                 PRN TR     219
                    6001 CONTINUE                                                PRN TR     220
220                 1005 FORMAT(I9,3F13.0,4X,6I3,8X,6F5.2)                       PRN TR     221
                      WRITE(6,1007) (SUM(I),I=1,3)                               PRNTR      222
                      WRITE(6,1009)                                              PRNTR      223
                      JSUM(1)=0                                                  PRN TR     224
                      JSUM(2)=0                                                  PRNTR      225
225                   DO 630 I=1,NSHIPS                                          PRN TR     226
                      IF(MOD(I,50).EQ.0) WRITE(6,1009)                           PRN TR     227
                      ITEMP(1)=NSHIP(I,1)                                        PRN TR     228
                      ITEMP(2)=MOD(NSHIP(I,15),100)                              PRN TR     229
```

```
                ITEMP(3)=IANSW(2)                                                PRNTR  230
238             IF(NSHIP(I,12).EQ.1) ITEMP(3)=IANSW(1)                           PRNTR  231
                IF(NSHIP(I,6).GT.IFIX(TIME*100.)) ITEMP(3)=IANSW(1)              PRNTR  232
                ITEMP(4)=MOD(NSHIP(I,2),100)                                     PRNTR  233
                ITEMP(5)=MOD(NSHIP(I,2)/100,100)                                 PRNTR  234
                ITEMP(6)=NSHIP(I,15)/100                                         PRNTR  235
235         C   DETERMINE SHIP TYPE                                              PRNTR  236
                IDSHIP=LVENT2                                                    PRNTR  237
                ISHPTP=NSHIP(IDSHIP,1)                                           PRNTR  238
            C   CHECK SHIP TYPE                                                  PRNTR  239
            C   FOR BREAK BULK                                                   PRNTR  240
240             IF(MTSHIP(ISHPTP,20).EQ.1) EL=4                                  PRNTR  241
            C   FOR CONTAINERSHIP                                               PRNTR  242
                IF(MTSHIP(ISHPTP,20).EQ.2) EL=2                                  PRNTR  243
            C   FOR RO/RO                                                       PRNTR  244
                IF(MTSHIP(ISHPTP,20).EQ.3) EL=2                                  PRNTR  245
245         C   FOR LASH                                                        PRNTR  246
                IF(MTSHIP(ISHPTP,20).EQ.4) EL=1.6                                PRNTR  247
            C   DETERMINE SHIP TYPE (OTHER KIND OF SHIP TYPE)                    PRNTR  248
                NST=ITEMP(1)                                                     PRNTR  249
            C   DETERMINE SHIP SPEED IN KNOTS                                   PRNTR  250
250             SS=MTSHIP(NST,14)                                                PRNTR  251
            C   DETERMINE SHIP VOLUME IN MT                                     PRNTR  252
                SV=MTSHIP(NST,11)                                                PRNTR  253
            C   COMPUTE NOTIONAL EQUIVALENT                                     PRNTR  254
                EN1=FLOAT(ITEMP(6))*SV                                           PRNTR  255
255             EN2=9872./(24.*SS)+EL                                            PRNTR  256
                XNOTEQ=(EN1/EN2)/654.                                            PRNTR  257
            C   COMPUTE SUBTOTALS FOR NOTIONAL SHIPS                            PRNTR  258
                IF(ITEMP(2).EQ.2) STNS1=STNS1+XNOTEQ                             PRNTR  259
                IF(ITEMP(2).EQ.1) STNS2=STNS2+XNOTEQ                             PRNTR  260
260             IF(ITEMP(2).EQ.5) STNS2=STNS2+XNOTEQ                             PRNTR  261
            C   SUM UP TOTAL NUMBER OF NOTIONAL SHIPS                            PRNTR  262
                TNNS=TNNS+XNOTEQ                                                 PRNTR  263
                IF(ITEMP(6).LE.0) GO TO 630                                      PRNTR  264
                JSUM(1)=JSUM(1)+1                                                PRNTR  265
265             JSUM(2)=ITEMP(6)+JSUM(2)                                         PRNTR  266
            630 WRITE(6,1010) I,(ITEMP(J),J=1,6),XNOTEQ                          PRNTR  267
                WRITE(6,625) JSUM                                                PRNTR  268
                PRINT 626, TNNS                                                  PRNTR  269
                PRINT 627, STNS1                                                 PRNTR  270
270             PRINT 628, STNS2                                                 PRNTR  271
            627 FORMAT(1H0,10X,*MSC CONTROLLED FLEET =*,F9.2)                    PRNTR  272
            628 FORMAT(1H0,10X,*SEALIFT READINESS PROGRAM =*,F9.2)               PRNTR  273
            626 FORMAT(1H0,5X,*TOTAL NUMBER OF NOTIONAL SHIPS =*,F10.2)          PRNTR  274
                TNNS=0.                                                          PRNTR  275
275             STNS1=0.                                                         PRNTR  276
                STNS2=0.                                                         PRNTR  277
            625 FORMAT(//5X,*TOTAL NUMBER OF SHIPS USE =*, I4//5X,*TOTAL NUMBER OF PRNTR  278
               1 DELIVERY CYCLES =*,I4)                                          PRNTR  279
           1009 FORMAT(1H1,5X,*SHIP RESUME*///5X,2(*SHIP*,4X),*OWN-*,5X,*POOL*,5X, PRNTR  280
280            1*LAST*,4X,*NEXT*,4X,*THEATER*,4X,*NOTIONAL*/                     PRNTR  281
               26X,*NO.*,4X,*TYPE*,4X,*ER*,6X,*STATUS*,                          PRNTR  282
               3   2(4X,*PORT*)5X,*CYCLES*,4X,*EQUIVALENT*//)                    PRNTR  283
           1010 FORMAT(1X,3I8,4X,A6,3I8,4X,F9.2)                                 PRNTR  284
                SSAVE=SUM(1)                                                     PRNTR  285
285        1007 FORMAT(//4X,*TOTAL*,3F13.0   )                                   PRNTR  286
```

```
      C      ZMAF LIFT                                                        PRNTR   287
      C      MTAFOE=714*IDR2+2841*IDR+5351*(15+IDR)+270929                    PRNTR   288
             IDPOL=10                                                         PRNTR   289
             MTAFOE=KA(1)*IDR2+498*IDPOL+KA(2)*IDR+KA(3)*(IDPOL+15)+KA(4)*    PRNTR   290
     290    1(IDR+15)+KA(5)                                                  PRNTR   291
             MTADM=3304*(15+IDR)+215843                                       PRNTR   292
             IMAP=IMO+15+IDR-IDRS                                             PRNTR   293
             MAFA=IDADMN+15+IDR-IDRS                                          PRNTR   294
             JD=IMAP+5                                                        PRNTR   295
     295     LD=MAFA+5                                                        PRNTR   296
             NTOTEX=NTOTSF=L=K=IDD=N=0                                        PRNTR   297
             IDRSPOL =10                                                      PRNTR   298
             IMAPOL=IMO+15+IDPOL-IDRSPOL                                      PRNTR   299
              JDPOL=IMAPOL+5                                                  PRNTR   300
     300     NAVEX=NAVSF=NND=0                                                PRNTR   301
             DO 120 I=1,NSO                                                   PRNTR   302
             IDAY=5*I                                                         PRNTR   303
             IF(IDAFOE.GT.IDAY) GO TO 611                                     PRNTR   304
             IDD=MTAFOE                                                       PRNTR   305
     305     NND=NND+1                                                        PRNTR   306
       611   IF(JD.GT.IDAY) GO TO 1611                                        PRNTR   307
             IF (JDPOL.LE.IDAY) GO TO 1612                                    PRNTR   308
             N=N+KA(6)                                                        PRNTR   309
              GO TO 612                                                       PRNTR   310
     310    1611 IF(JDPOL.GT.IDAY) GO TO 612                                  PRNTR   311
             N=N+KA(7)                                                        PRNTR   312
             GO TO 612                                                        PRNTR   313
      1612   N=N+KA(8)                                                        PRNTR   314
       612   IF(IDADMN.GT.IDAY) GO TO 613                                     PRNTR   315
     315     K=MTADM                                                          PRNTR   316
       613   IF(LD.GT.IDAY) GO TO 614                                         PRNTR   317
             L=L+16520                                                        PRNTR   318
      C      ZMAF LIFT                                                        PRNTR   319
      C 614  RIY(I)=IDD+N+K+L                                                 PRNTR   320
     320     614 RIY(I)=IDD+N                                                 PRNTR   321
             IF(RIY(I).LT.ISD(I,2)) GO TO 616                                 PRNTR   322
       615   ISF(I)=(RIY(I)-ISD(I,2))                                         PRNTR   323
             IEXC(I)=0                                                        PRNTR   324
             IF(IDAY.GE.IDAFOE ) NTOTSF=NTOTSF+ISF(I)                         PRNTR   325
     325     GO TO 120                                                        PRNTR   326
       616   IEXC(I)=(ISD(I,2)-RIY(I))                                        PRNTR   327
             ISF(I)=0                                                         PRNTR   328
             NTOTEX=NTOTEX+IEXC(I)                                            PRNTR   329
             IF(IDAY.GE.IDAFOE) NTOTEX=NTOTEX+IEXC(I)                         PRNTR   330
     330     120 CONTINUE                                                     PRNTR   331
             IF(NND.LE.0) GO TO 121                                           PRNTR   332
             NAVSF=NTOTSF/NND                                                 PRNTR   333
             NAVEX=NTOTEX/NND                                                 PRNTR   334
       121   WRITE(6,1008)                                                    PRNTR   335
     335     DO 53 I=1,NSO                                                    PRNTR   336
             XSUM(2)=0                                                        PRNTR   337
             XSUM(1)=0                                                        PRNTR   338
             IF(RIY(I).GT.0.0)                                                PRNTR   339
            1XSUM(2)=FLOAT(ISD(I,2)),RIY(I)                                   PRNTR   340
     340     53 WRITE(6,1118)(ISD(I,J),J=1,3),PERC1(I),XSUM(2),ISF(I),IAVAL(I) PRNTR   341
            1,RIY(I)                                                          PRNTR   342
             WRITE(6,5001) NTOTSF,NAVSF                                       PRNTR   343
```

```
                5001 FORMAT(//5X,*TOTAL SHORTFALL =*,I10/ 5X,*AVERAGE SHORTFALL =*,I10)  PRNTR     344
                     TBX=TBT/FLOAT(KTBT)                                                 PRNTR     345
345                  PRINT 5002, TBX                                                     PRNTR     346
                5002 FORMAT(1H0,5X,*AVERAGE BUILDUP ASHORE OVER MISSION (LESS TYPE 3) = PRNTR     347
                    1*,F7.1,* DAYS*)                                                     PRNTR     348
                1000 FORMAT(1H1,4X,*... C A R G O  /  S H I P  S U M M A R Y*            PRNTR     349
                    1       //5X,*TIME*,5X,*CARGO DELIVERED*,5X,*SHIPS IN POOL*        PRNTR     350
358                 2,5X,*VOL UTILIZATION*,5X,*CARGO DEL/REQ*                           PRNTR     351
                    3,5X,*SHORTFALL* ,2X,*VOL AVAIL*,5X,*REQUIREMENT*)                  PRNTR     352
                1110 FORMAT(5X,I4,5X,I15,5X,I8,5X,F15.5,5X,F15.5,2I14,F16.0)            PRNTR     353
                     PRINT 5000, IDR,IMD,IDR2,IDAFOE,IOPOL,IDADMN,IDRS,IDRSFOL          PRNTR     354
                5000 FORMAT(///5X,*DAYS OF SUPPLY:*//10X,*ALL GROUPS (EXC II+III)*,I7,  PRNTR     355
355                 15X,*D-DAY (M-SCALE)*,I10/10X,*GROUP II*,I22,5X,*DAY AFOE REQ*,I10  PRNTR     356
                    2/10X,*GROUP III*,I21,5X,*DAY ADMIN REQ*,I17/10X,*BUILD UP ASHORE (  PRNTR     357
                    3EXC III)*,I5,5X,*BUILD UP ASHORE (GR III)*,I5)                     PRNTR     358
                C    COMPUTE AND PRINT PERCENT OF CYCLE TIME A TRANSFER CRAFT IS BEING   PRNTR     359
                C     UNLOADED AT BEACH FOR EACH TYPE OF TRANSFER CRAFT                  PRNTR     360
360                  X=XTCFT(1,1)/15.+DOFFSH/XTCFT(1,2)+DTME(1)+XTCFT(1,1)/XSUFAC(1)+   PRNTR     361
                    1DOFFSH/XTCFT(1,2)                                                   PRNTR     362
                     Y(1)=(XTCFT(1,1)/XSUFAC(1))/X                                       PRNTR     363
                     Y(1)=Y(1)*100.                                                      PRNTR     364
                     X=XTCFT(2,1)/15.+DOFFSH/XTCFT(2,2)+DTME(2)+XTCFT(2,1)/XSUFAC(1)     PRNTR     365
365                 1+DOFFSH/XTCFT(2,2)                                                  PRNTR     366
                     Y(2)=(XTCFT(2,1)/XSUFAC(1))/X                                       PRNTR     367
                     Y(2)=Y(2)*100.                                                      PRNTR     368
                     X=XTCFT(3,1)/XUP+DOFFSH/XTCFT(3,2)+DTME(3)+XTCFT(3,1)/XSUFAC(2)+    PRNTR     369
                    1DOFFSH/XTCFT(3,2)                                                   PRNTR     370
370                  Y(3)=(XTCFT(3,1)/XSUFAC(2))/X                                       PRNTR     371
                     Y(3)=Y(3)*100.                                                      PRNTR     372
                     X=XTCFT(3,1)/2716.+DOFFSH/XTCFT(3,2)+DTME(3)+XTCFT(3,1)/2716.+      PRNTR     373
                    1DOFFSH/XTCFT(3,2)                                                   PRNTR     374
                     Y(4)=(XTCFT(3,1)/2716.)/X                                           PRNTR     375
375                  Y(4)=Y(4)*100.                                                      PRNTR     376
                     PRINT 999                                                           PRNTR     377
                     DO 972 M=1,4                                                        PRNTR     378
                     MM=TTCS(M)+.5                                                       PRNTR     379
                 972 TTCS(M)=MM                                                          PRNTR     380
380             C    COMPUTE AVERAGE NUMBER OF TIMES EACH TYPE OF CRAFT COMES TO SHORE   PRNTR     381
                     ATTCS(1)=TTCS(1)/FLOAT(ITCFT(1,1))                                  PRNTR     382
                     ATTCS(2)=TTCS(2)/FLOAT(ITCFT(2,1))                                  PRNTR     383
                     ATTCS(3)=(TTCS(3)+TTCS(4))/FLOAT(ITCFT(3,1))                        PRNTR     384
                C    COMPUTE TOTAL UNLOADING TIMES FOR EACH TYPE OF CRAFT                PRNTR     385
385                  TUNLTC(1)=TTCS(1)*UNLTC(1)                                          PRNTR     386
                     TUNLTC(2)=TTCS(2)*UNLTC(2)                                          PRNTR     387
                     TUNLTC(3)=TTCS(3)*UNLTC(3)+TTCS(4)*UNLTC(4)                         PRNTR     388
                     TTCS(3)=TTCS(3)+TTCS(4)                                             PRNTR     389
                     PRINT 890                                                           PRNTR     390
390                 890 FORMAT(40X,*TRANSFER CRAFT UNLOADING INFORMATION*/)              PRNTR     391
                     PRINT 892                                                           PRNTR     392
                 892 FORMAT(1H-,5X,*NAME*,17X,*PERCENT*,10X,*AVERAGE*,10X,*TOTAL*,9X,    PRNTR     393
                    1*AVERAGE*,11X,*TOTAL*)                                              PRNTR     394
                     PRINT 894                                                           PRNTR     395
395                  894 FORMAT(25X,*CYCLE TIME     UNLOADING TIME     UNLOADING     TRIPS PRNTR     396
                    1ASHORE        TRIPS*)                                              PRNTR     397
                     PRINT 896                                                           PRNTR     398
                 896 FORMAT(26X,*UNLOADED*,8X,*PER CRAFT*,11X,*TIME*,8X,*PER CRAFT*,     PRNTR     399
                    110X,*ASHORE*)                                                       PRNTR     400
```

```
      PRINT 898                                                          PRNTR  401
  898 FORMAT(44X,*(HOURS)*,9X,*(HOURS)*)                                 PRNTR  402
      PRINT 900, NMCFT(1),Y(1),UNLTC(1),TUNLTC(1),ATTCS(1),TTCS(1)       PRNTR  403
      PRINT 900, NMCFT(2),Y(2),UNLTC(2),TUNLTC(2),ATTCS(2),TTCS(2)       PRNTR  404
  900 FORMAT(1H-,2X,A10,10X,F10.2,8X,F9.3,7X,F10.2,7X,F8.2,8X,F9.0)      PRNTR  405
      PRINT 902, Y(3),UNLTC(3)                                           PRNTR  406
  902 FORMAT(1H-,3X,*CAUSEWAY FERRY*,5X,F10.2,8X,F9.3,7X,F10.2,7X,F8.2,  PRNTR  407
     1 18X,F9.0)                                                         PRNTR  408
      PRINT 904                                                          PRNTR  409
  904 FORMAT(1X,*(CONTAINERIZED CARGO)*)                                 PRNTR  410
      PRINT 902, Y(4),UNLTC(4)                                           PRNTR  411
      PRINT 906                                                          PRNTR  412
  906 FORMAT(4X,*(RO/RO CARGO)*)                                         PRNTR  413
      PRINT 908, TUNLTC(3),ATTCS(3),TTCS(3)                              PRNTR  414
  908 FORMAT(1H-,3X,*CAUSEWAY FERRY*,39X,F10.2,7X,F8.2,8X,F9.0)          PRNTR  415
      PRINT 910                                                          PRNTR  416
  910 FORMAT(1X,*(CONTAINERIZED CARGO*)                                  PRNTR  417
      PRINT 912                                                          PRNTR  418
  912 FORMAT(2X,*AND RO/RO CARGO*)                                       PRNTR  419
      PRINT 914                                                          PRNTR  420
  914 FORMAT(4X,*COMBINED)*)                                             PRNTR  421
 6002 IF(MTEST.EQ.1) GO TO 888                                           PRNTR  422
      IF(TIME.NE.TIMIT) GO TO 888                                        PRNTR  423
      IF(NTEST.GT.0) GO TO 883                                           PRNTR  424
      DO 777 I=1,4                                                       PRNTR  425
  777 ITCFT(I,1)=ICRF(I)                                                 PRNTR  426
      WRITE(6,7000) ICRF                                                 PRNTR  427
 7000 FORMAT(5X,*MAX LANDING CRAFT USED ON FIRST ITERATION =*,4I6)       PRNTR  428
       GO TO 887                                                         PRNTR  429
  883 IF(SHTFLM.LE.0.0) GO TO 881                                        PRNTR  430
      IF(NTOTSF.GT.SHTFLM) GO TO 886                                     PRNTR  431
      GO TO 887                                                          PRNTR  432
  881 IF(NTOTSF.GT.SHTFL) GO TO 886                                      PRNTR  433
  887 SHTFL=NTOTSF                                                       PRNTR  434
      NTEST=NTEST+1                                                      PRNTR  435
      DO 885 JJ=1,4                                                      PRNTR  436
  885 LOCRF(JJ)=ITCFT(JJ,1)                                              PRNTR  437
       GO TO 884                                                         PRNTR  438
  886 MTEST=1                                                            PRNTR  439
  884 DO 9999 I=1,21576                                                  PRNTR  440
 9999 SUMSHP(I)=0                                                        PRNTR  441
      REWIND 5                                                           PRNTR  442
      CALL ITERAT                                                        PRNTR  443
      RETURN                                                             PRNTR  444
  888 CONTINUE                                                           PRNTR  445
      IF(LVENT1.EQ.8.OR.TIME.EQ.TINVL) PRINT 999                         PRNTR  446
  999 FORMAT(1H1)                                                        PRNTR  447
      IF(TIME.EQ.TINVL) TINVL=TINVL+TIMSAV                               PRNTR  448
      TEVENT=TIME+5.0                                                    PRNTR  449
      LVENT1=6                                                           PRNTR  450
      CALL PUT                                                           PRNTR  451
      RETURN                                                             PRNTR  452
      END                                                                PRNTR  453
```

PUT

Activity Performed: Places events on event list in order of encounter.

Type: Subroutine

Common Used: /GEN/

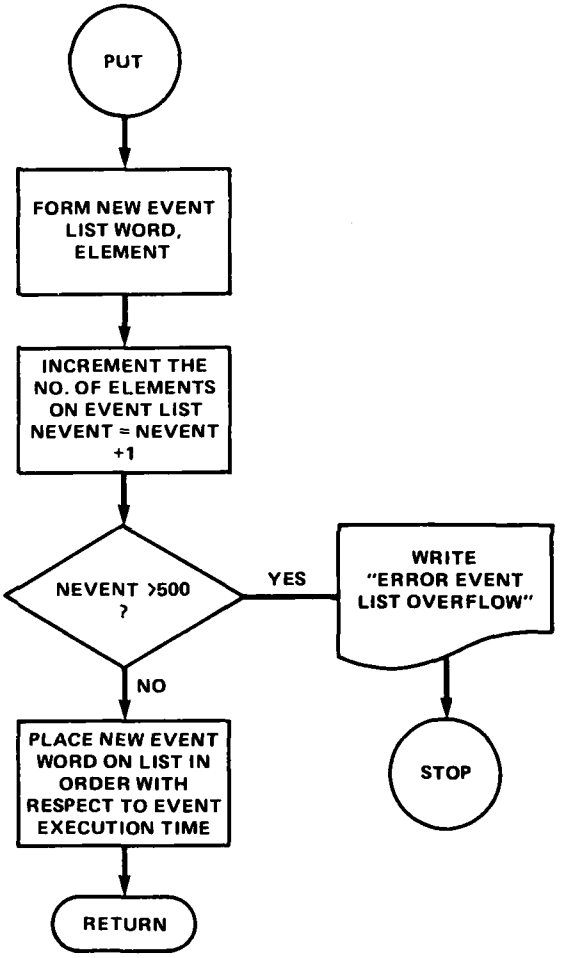
Called by: AVRAGE, GENCAR, LDSH, PRNTR, RDPARM, RLDSH, SHPARV, SHPLV, SPOOL, UNLDSH

Subroutines Called: none

Events Stored: none

Description:

PUT enters an event on the event list, KEVENT, and orders the list according to increasing event execution times.


PUT
FORM NEW EVENT LIST WORD, ELEMENT
INCREMENT THE NO. OF ELEMENTS ON EVENT LIST NEVENT = NEVENT +1
NEVENT >500 ?
YES
WRITE "ERROR EVENT LIST OVERFLOW"
STOP
NO
PLACE NEW EVENT WORD ON LIST IN ORDER WITH RESPECT TO EVENT EXECUTION TIME
RETURN

```
      SUBROUTINE PUT
C-----------------------------------------------------------------------
C     PUT PLACES AN EVENT WORD ON THE EVENT LIST
C-----------------------------------------------------------------------
      COMMON
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN
       ITIME=TEVENT*1000.    +.5
      KTEMP=ITIME*100000000+LVENT3*10000000+LVENT2*100+LVENT1
       K=NEVENT+1
      IF(K.GT.500) GO TO 30
       NEVENT=K
       IF(NEVENT.LE.1) GO TO 20
   10 KTEST=KEVENT(K-1)/100000000
       IF(KTEST.GT.ITIME) GO TO 20
       KEVENT(K)=KEVENT(K-1)
      K=K-1
       IF(K.GT.1) GO TO 10
   20 KEVENT(K)=KTEMP
       RETURN
   30 WRITE(6,1000)
 1000 FORMAT(//5X,*ERROR EVENT LIST OVERFLOW*)
       STOP
       END
```

PUT 2
PUT 3
PUT 4
PUT 5
PUT 6
PUT 7
PUT 8
PUT 9
PUT 10
PUT 11
PUT 12
PUT 13
PUT 14
PUT 15
PUT 16
PUT 17
PUT 18
PUT 19
PUT 20
PUT 21
PUT 22
PUT 23
PUT 24
PUT 25

RLDSH

Activity Performed: Simulates the unloading of cargo at commercial ports.

Type: Event

Common Used: /CARGOG/, /CONTRL/, /GEN/, /PORT/, /SHIP/

Called by: TAKE

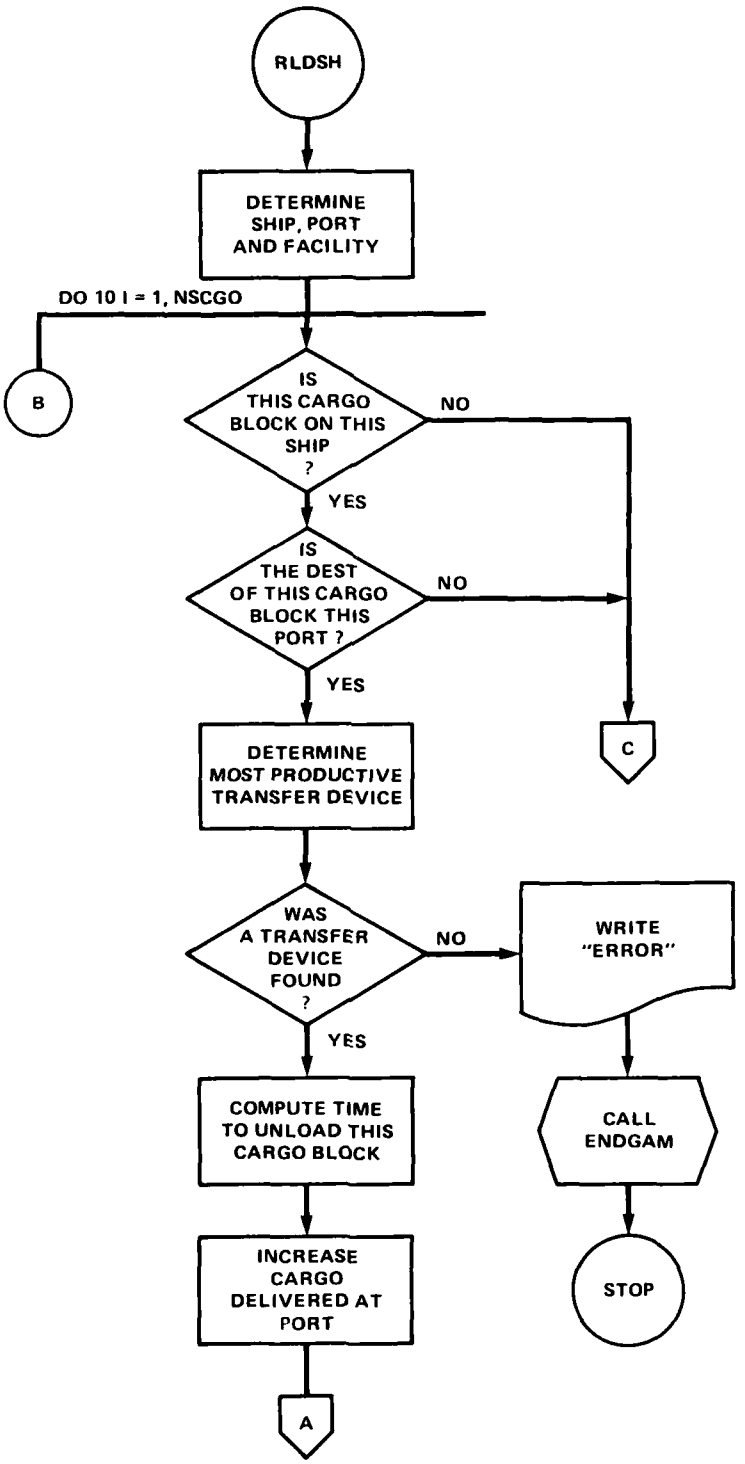
Stored by: SHPARV

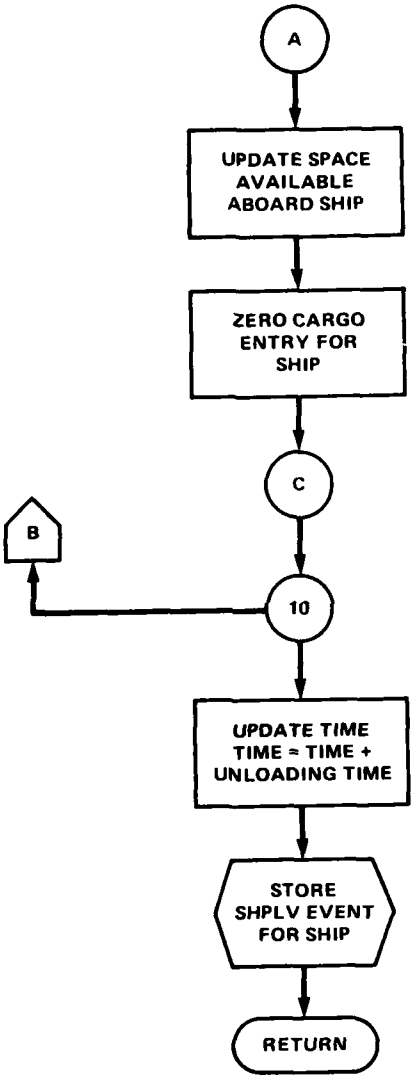
Subroutines Called: ENDGAM, PUT

Events Stored: LDSH

Description:

RLDSH simulates cargo unloading at a commercial port. It assigns berth/ship transfer systems suitable for cargo movement. When unloading is completed, a LDSH event is stored to perform loading operations.


RLDSH
DETERMINE SHIP, PORT AND FACILITY
DO 10 I = 1, NSCGO
B
IS THIS CARGO BLOCK ON THIS SHIP ?
NO
YES
IS THE DEST OF THIS CARGO BLOCK THIS PORT ?
NO
YES
C
DETERMINE MOST PRODUCTIVE TRANSFER DEVICE
WAS A TRANSFER DEVICE FOUND ?
NO
WRITE "ERROR"
YES
COMPUTE TIME TO UNLOAD THIS CARGO BLOCK
CALL ENDGAM
INCREASE CARGO DELIVERED AT PORT
STOP
A


A
UPDATE SPACE AVAILABLE ABOARD SHIP
ZERO CARGO ENTRY FOR SHIP
C
B
10
UPDATE TIME TIME = TIME + UNLOADING TIME
STORE SHPLV EVENT FOR SHIP
RETURN

```
      SUBROUTINE RLOSH                                                  RLOSH      2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    RLOSH      3
     1 ,ADJCGO(8),NTEST                                                 RLOSH      4
      COMMON /SUMY/ SUMSHP(30,10),SUMPRT(30,10) ,ISMPRT(30,6)           RLOSH      5
      COMMON                                                            RLOSH      6
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     RLOSH      7
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       RLOSH      8
     1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                       RLOSH      9
     2, JCARGO(1000,3),CARGO(1000),NSCGO                                RLOSH     10
     1/SHIP/ NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)      RLOSH     11
     1/PORT/NPORT(30,6),IFAC(30,10)                                     RLOSH     12
     2,IQUEUE(1000,2),NQUEUE                                            RLOSH     13
      IDSHIP=LVENT2                                                     RLOSH     14
       IDPORT=LVENT3                                                    RLOSH     15
       IFAC1=NSHIP(IDSHIP,13)                                           RLOSH     16
      ITYPE=NSHIP(IDSHIP,1)                                             RLOSH     17
       IF(IOUT.EQ.1) WRITE(6,1000)TIME,IDPORT,IDSHIP,IFAC1              RLOSH     18
 1000 FORMAT(5X,F7.3,5X,I4,5X,I4,5X,*SHIP UNLOAD AT FACILITY=*,I4)      RLOSH     19
      TEVENT=0                                                          RLOSH     20
      DO 10 I=1,NSCGO                                                   RLOSH     21
      IF(CARGO(I).LE.0) GO TO 10                                        RLOSH     22
      IF(IDSHIP.NE.JCARGO(I,1)) GO TO 10                                RLOSH     23
      IF(IDPORT.NE.JCARGO(I,2)) GO TO 10                                RLOSH     24
      ICT=JCARGO(I,3)                                                   RLOSH     25
      JCARGO(I,1)=0                                                     RLOSH     26
      NSHIP(IDSHIP,9)=NSHIP(IDSHIP,9)+CARGO(I)                          RLOSH     27
      NSHIP(IDSHIP,10)=NSHIP(IDSHIP,10)+CARGO( I)/ADJCGO(ICT)           RLOSH     28
      ISAVE=0                                                           RLOSH     29
      SAVE=0                                                            RLOSH     30
      DO 20 II=1,6                                                      RLOSH     31
      IF(MTSHP2(ITYPE,II).LE.0) GO TO 20                                RLOSH     32
      IF(SAVE.GE.PRODUC(IFAC1,II,ICT)) GO TO 20                         RLOSH     33
      ISAVE=II                                                          RLOSH     34
      SAVE=PRODUC(IFAC1,II,ICT)                                         RLOSH     35
   20 CONTINUE                                                          RLOSH     36
      IF(ISAVE.GT.0) GO TO 30                                           RLOSH     37
      WRITE(6,1003) IDPORT,IDSHIP                                       RLOSH     38
 1003 FORMAT(5X,*ERROR*,I11,I9,5X,*NO TRANSFER DEVICES FOR SERVICE*)    RLOSH     39
      CALL ENDGAM                                                       RLOSH     40
      STOP                                                              RLOSH     41
   30 FACTOR=1.0                                                        RLOSH     42
      IF(MTSHP2(ITYPE,7).GT.1) FACTOR=FLOAT(MTSHP2(ITYPE,8))*.001       RLOSH     43
      TEVENT=TEVENT+CARGO(I)/(PRODUC(IFAC1,ISAVE,ICT)*FLOAT(NPORT(IDPORT RLOSH     44
     1,6))*.001*FACTOR)                                                 RLOSH     45
      SUMPRT(IDPORT,3)=SUMPRT(IDPORT,3)+CARGO(I)                        RLOSH     46
      IF(IOUT.EQ.1) WRITE(6,1001) ICT,CARGO(I)                          RLOSH     47
 1001 FORMAT(35X,*ICT=*,I4,* MTS=*,F10.2)                               RLOSH     48
      CARGO(I)=0                                                        RLOSH     49
   10 CONTINUE                                                          RLOSH     50
      IF(IOUT.EQ.1) WRITE(6,1002) TEVENT                                RLOSH     51
 1002 FORMAT(35X,*TIME TO  UNLOAD AT PORT =*,F7.3)                      RLOSH     52
      LVENT1=4                                                          RLOSH     53
      LVENT2=IDSHIP                                                     RLOSH     54
      LVENT3=IDPORT                                                     RLOSH     55
      TEVENT=TEVENT+TIME                                                RLOSH     56
      CALL PUT                                                          RLOSH     57
      RETURN                                                            RLOSH     58
      END                                                               RLOSH     59
```

RNG1(RNG)

Activity Performed: Computes a random number between zero and one.

Type: Subroutine

Common Used: /GEN/

Called by: DISTRI, RDPARM

Stored by: n/a

Routines Called: none

Events Stored: none

Description:

RNG1, (RNG) computes a random number between 0 and 1. This random number is used to compute a dependent variable from a specified distribution curve.

```
      SUBROUTINE RNG1                                                    RNG1    2
C-----------------------------------------------------------------------  RNG1    3
C     RNG/RNG1 COMPUTES A RANDOM NUMBER BETWEEN ZERO AND ONE             RNG1    4
C-----------------------------------------------------------------------  RNG1    5
      COMMON                                                             RNG1    6
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,      RNG1    7
     2 NNPORT                                                            RNG1    8
       SAVE=37.*.37843                                                   RNG1    9
       SAVE=SAVE-AINT(SAVE)                                              RNG1   10
      DO 100 I=1,100                                                     RNG1   11
  100 SAVE=SAVE*37.-AINT(SAVE*37.)                                       RNG1   12
      GO TO 115                                                          RNG1   13
      ENTRY RNG                                                          RNG1   14
  115 SAVE=SAVE*37.-AINT(SAVE*37)                                        RNG1   15
      RN=SAVE                                                            RNG1   16
      RETURN                                                             RNG1   17
      END                                                                RNG1   18
```

SHPARV

Activity Performed: Assigns an incoming ship to an appropriate berth.

Type: Event

Common Used: /CARGOG/, /CONTRL/, /GEN/, /PORT/, /SHIP/, /SUMY/

Called by: TAKE

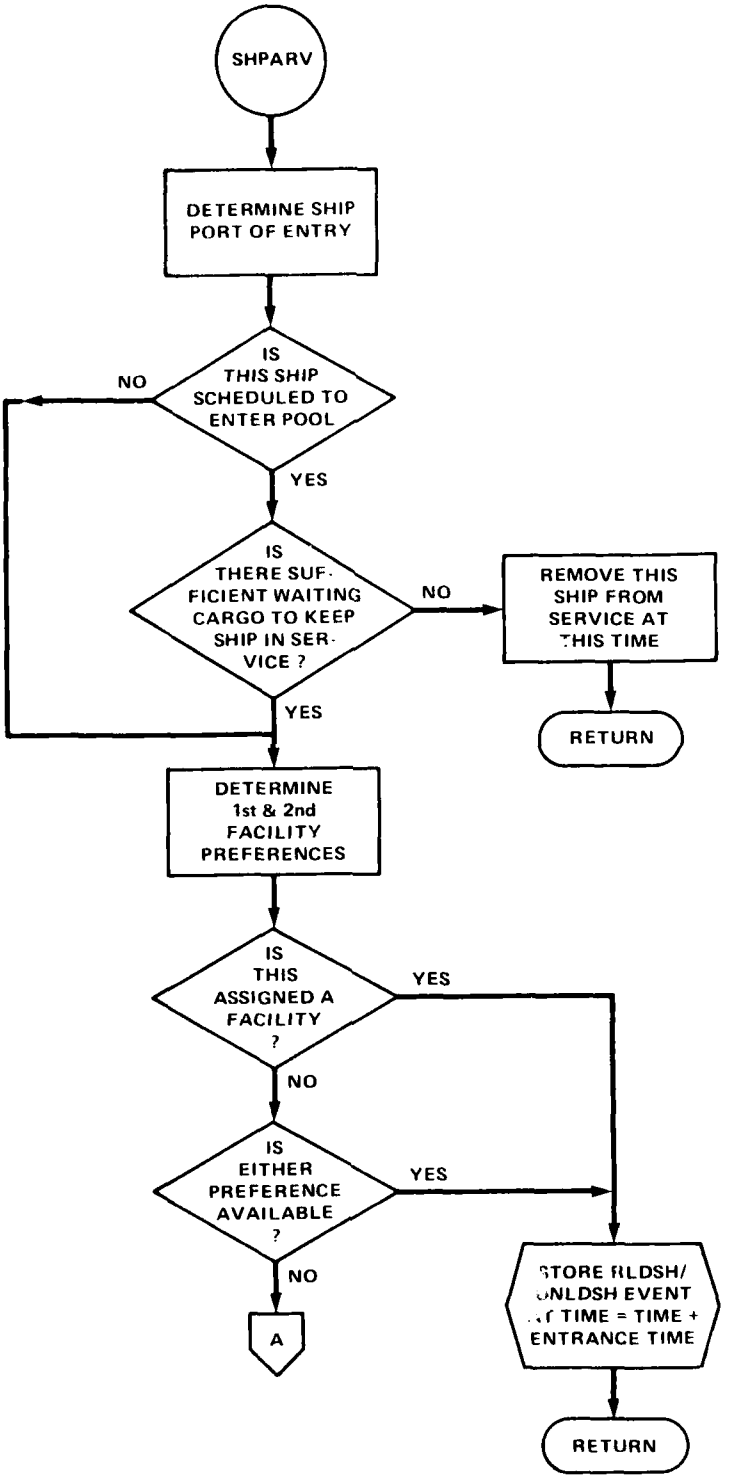
Stored by: RDPARM, SHPLV, SPOOL

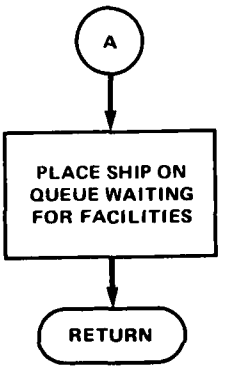
Subroutines Called: ENDGAM, PUT

Events Stored: RLDSH, SHPLV, UNLDSH

Description:

SHPARV assigns a ship to a berth according to the berth types preferred by the ship. Only berths immediately available at the time the ship enters the port are considered. If no appropriate berth is available, the ship enters a berth queue until a preferred berth type is free. All berths accept ships for cargo transfer on a first come, first-served basis.

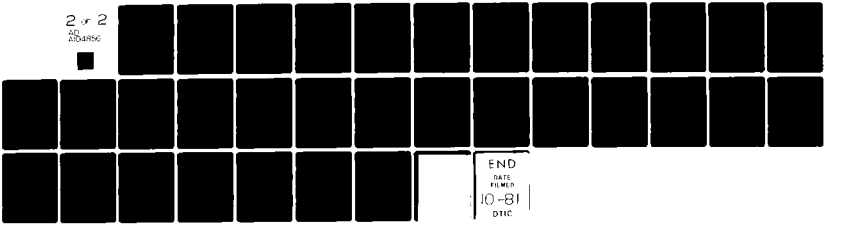

SHPARV
DETERMINE SHIP PORT OF ENTRY
IS THIS SHIP SCHEDULED TO ENTER POOL
NO
YES
IS THERE SUF-FICIENT WAITING CARGO TO KEEP SHIP IN SER-VICE ?
NO
REMOVE THIS SHIP FROM SERVICE AT THIS TIME
RETURN
YES
DETERMINE 1st & 2nd FACILITY PREFERENCES
IS THIS ASSIGNED A FACILITY ?
YES
NO
IS EITHER PREFERENCE AVAILABLE ?
YES
NO
A
STORE RLDSH/ ONLDSH EVENT ... TIME = TIME + ENTRANCE TIME
RETURN


A
PLACE SHIP ON QUEUE WAITING FOR FACILITIES
RETURN

```
      SUBROUTINE SHPARV                                                 SHPARV      2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    SHPARV      3
     1 ,ADJCGO(8),NTEST                                                 SHPARV      4
      COMMON /SUMV/ SUMSHP(30,10),SUMPRT(30,10) ,ISMPRT(30,6)           SHPARV      5
      COMMON                                                            SHPARV      6
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     SHPARV      7
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       SHPARV      8
     1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                       SHPARV      9
     2, JCARGO(1000,3),CARGO(1000),NSCGO                                SHPARV     10
     1/SHIP/ NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)      SHPARV     11
     1/PORT/NPORT(30,6),IFAC(30,10)                                     SHPARV     12
     3,IQUEUE(1000,2),NQUEUE,NSE(30,30)                                 SHPARV     13
      IDSHIP=LVENT2                                                     SHPARV     14
      IDPORT=LVENT3                                                     SHPARV     15
      NSHIP(IDSHIP,2)=IDPORT                                            SHPARV     16
      ITYPE=NSHIP(IDSHIP,1)                                             SHPARV     17
      IF(NSHIP(IDSHIP,12).NE.2) GO TO 100                               SHPARV     18
      IF(NSHIP(IDSHIP,7).GT.0) GO TO 101                                SHPARV     19
      NSHIP(IDSHIP,12)=1                                                SHPARV     20
      SUMSHP(ITYPE,5)=SUMSHP(ITYPE,5)+1                                 SHPARV     21
       RETURN                                                           SHPARV     22
  101 NSHIP(IDSHIP,6)=SUMSHP(ITYPE,6)+1                                 SHPARV     23
      NSHIP(IDSHIP,12)=0                                                SHPARV     24
  100 CONTINUE                                                          SHPARV     25
      IF(IOUT.EQ.1) WRITE(6,1000) TIME,IDPORT,IDSHIP                    SHPARV     26
 1000 FORMAT(5X,F7.3,5X,I4,5X,I4,5X,*SHIP HAS ARRIVED AT PORT*)         SHPARV     27
C     CHECK MODE OF OPERATION, LOAD/UNLOAD                              SHPARV     28
      IF(NSHIP(IDSHIP,12).NE.1) GO TO 120                               SHPARV     29
      DO 60 I=1,NCARGN                                                  SHPARV     30
      IF(CARGEN(I).LT.500.) GO TO 60                                    SHPARV     31
      IF(MOD(KARGEN(I,1)/10,100).NE .IDPORT) GO TO 60                   SHPARV     32
      DO 61 II=1,5                                                      SHPARV     33
      IF(MTSHIP(ITYPE,II).NE.MOD(KARGEN(I,1),10)) GO TO 61              SHPARV     34
      NSHIP(IDSHIP,12)=0                                                SHPARV     35
      GO TO 120                                                         SHPARV     36
   61 CONTINUE                                                          SHPARV     37
   60 CONTINUE                                                          SHPARV     38
      NXPORT=0                                                          SHPARV     39
      CALL NXPRT(IDSHIP,IDPORT,NXPORT)                                  SHPARV     40
      IF(NXPORT.LE.0) GO TO 15                                          SHPARV     41
      LVENT1=5                                                          SHPARV     42
      CALL PUT                                                          SHPARV     43
      NSHIP(IDSHIP,12)=-NXPORT                                          SHPARV     44
      RETURN                                                            SHPARV     45
   15 IF(IOUT.EQ.1) WRITE(6,1003)                                       SHPARV     46
 1003 FORMAT(35X,*SHIP ENTERING POOL*)                                  SHPARV     47
      SUMSHP(ITYPE,5)=SUMSHP(ITYPE,5)+1                                 SHPARV     48
      SUMSHP(ITYPE,6)=SUMSHP(ITYPE,6)-1                                 SHPARV     49
      RETURN                                                            SHPARV     50
  120 IF(NPORT(IDPORT,5).EQ.1) GO TO 10                                 SHPARV     51
C     LOAD- DETRMINE FACILITIES TO BE USE BY SHIP                       SHPARV     52
      IF(NSHIP(IDSHIP,13).GT.0) GO TO 40                                SHPARV     53
      IFAC1=MTSHIP(ITYPE,9)                                             SHPARV     54
      IFAC2=MTSHIP(ITYPE,10)                                            SHPARV     55
C     DETERMINE FACILITIES AVAL                                         SHPARV     56
      IF(IFAC1.LE.0.AND.IFAC2.LE.0) GO TO 20                            SHPARV     57
      IF(IFAC(IDPORT,IFAC1).GT.0) GO TO 30                              SHPARV     58
```

AD-A104 856 DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CE--ETC F/G 15/5
TRADES: A COMPUTER SIMULATION DEPICTING CARGO SHIPMENT AND TRAN--ETC(U)
SEP 81 P E FRIEDENBERG, R E MELTON, M GRAY

UNCLASSIFIED DTNSRDC-81/066 NL



```
                IF(IFAC2.LE.0) GO TO 50                                          SHPARV     59
                IF(IFAC(IDPORT,IFAC2).LE.0) GO TO 50                             SHPARV     60
60              NSHIP(IDSHIP,13)=IFAC2                                           SHPARV     61
                GO TO 40                                                         SHPARV     62
             30 NSHIP(IDSHIP,13)=IFAC1                                           SHPARV     63
             40 TEVENT=TIME                                                      SHPARV     64
                LVENT1=9                                                         SHPARV     65
65              LVENT2=ICSHIP                                                    SHPARV     66
                LVENT3=IDPORT                                                    SHPARV     67
                CALL PUT                                                         SHPARV     68
                IFAC1=NSHIP(IDSHIP,13)                                           SHPARV     69
                IFAC(IDPORT,IFAC1)=IFAC(IDPORT,IFAC1)-1                          SHPARV     70
70              NSE(ITYPE,IDPORT)=NSE(ITYPE,IDPORT)-1                            SHPARV     71
                RETURN                                                           SHPARV     72
             10 TEVENT=TIME+FLOAT(NPORT(IDPORT,2))*.01                           SHPARV     73
                NSE(ITYPE,IDPORT)=NSE(ITYPE,IDPORT)-1                            SHPARV     74
                LVENT1=3                                                         SHPARV     75
75              LVENT2=IDSHIP                                                    SHPARV     76
                LVENT3=IDPORT                                                    SHPARV     77
                CALL PUT                                                         SHPARV     78
                RETURN                                                           SHPARV     79
             20 WRITE(6,1001) TIME,IDPORT,IDSHIP                                 SHPARV     80
80         1001 FORMAT( * ERROR*, 5X,F7.3,5X,I4,5X,I4,5X,*SHIP CAN NOT BERTH,NO FA SHPARV     81
               1CILITY TYPE GIVEN FOR SHIP*)                                     SHPARV     82
                CALL ENDGAM                                                      SHPARV     83
                RETURN                                                           SHPARV     84
             50 NQUEUE=NQUEUE+1                                                  SHPARV     85
85              IQUEUE(NQUEUE,1)=IDSHIP                                          SHPARV     86
                IQUEUE(NQUEUE,2)=IDPORT                                          SHPARV     87
                IF(IOUT.EQ.1) WRITE(6,1002)                                      SHPARV     88
         1002 FORMAT(35X,*FACILITIES NOT AVAIL,ENTER QUEUE*)                     SHPARV     89
                RETURN                                                           SHPARV     90
90              END                                                              SHPARV     91
```

SHPLV

Activity Performed: Releases all berth facilities used by a departing ship.

Type: Event

Common Used: /CARGOG/, /CONTRL/, /GEN/, /PORT/, /SHIP/, /SUMY/

Called by: TAKE

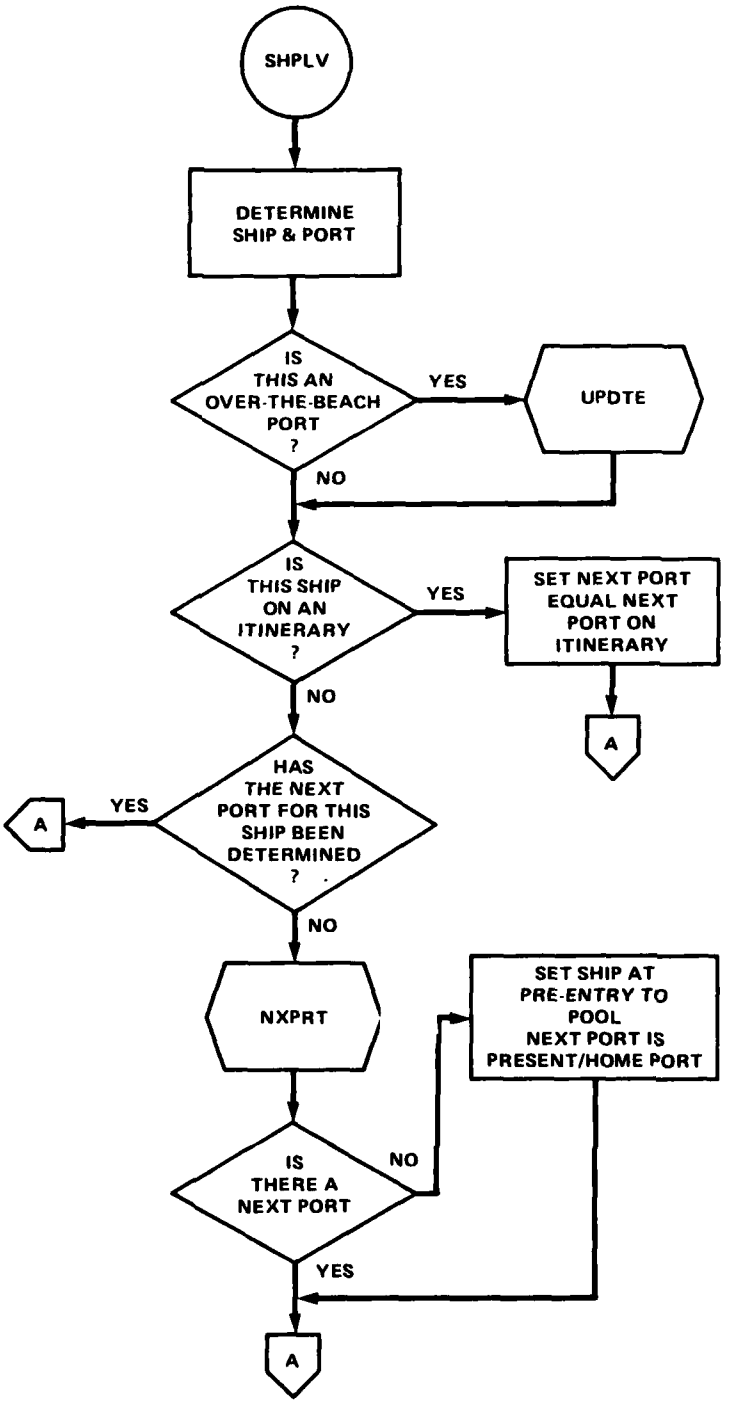
Stored by: LDSH, UNLDSH

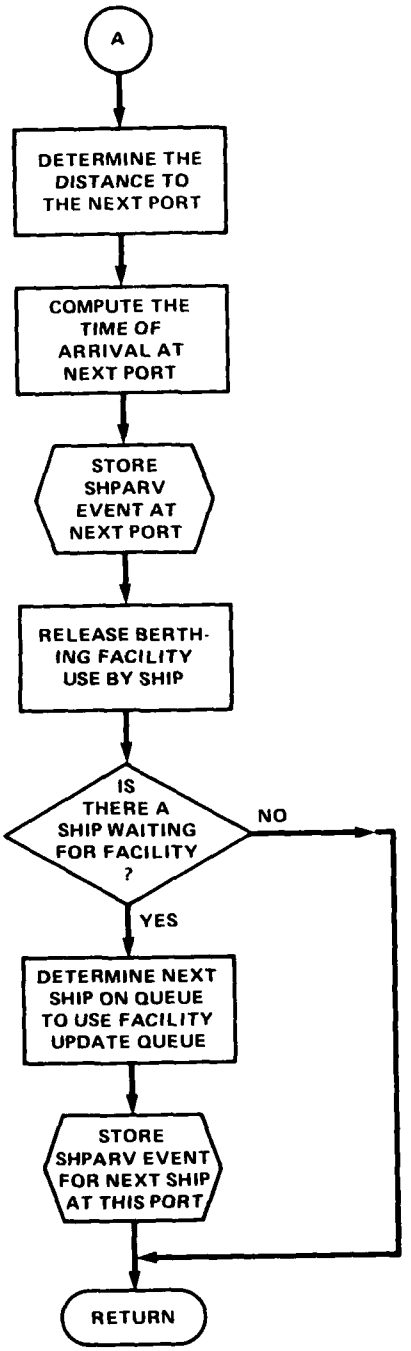
Subroutines Called: NXPRT, PUT, UPDTE

Events Stored: SHPARV

Description:

SHPLV frees all berth facilities used by the departing ship and determines the next port and the time necessary to sail to the next port. It determines whether any other ship is waiting to use the berth, removes the next waiting ship in the berth queue from the queue, and stores a SHPARV event for that ship.


SHPLV
DETERMINE SHIP & PORT
IS THIS AN OVER-THE-BEACH PORT ?
YES
UPDTE
NO
IS THIS SHIP ON AN ITINERARY ?
YES
SET NEXT PORT EQUAL NEXT PORT ON ITINERARY
A
NO
HAS THE NEXT PORT FOR THIS SHIP BEEN DETERMINED ?
YES
A
NO
NXPRT
SET SHIP AT PRE-ENTRY TO POOL NEXT PORT IS PRESENT/HOME PORT
IS THERE A NEXT PORT
NO
YES
A


A
DETERMINE THE DISTANCE TO THE NEXT PORT
COMPUTE THE TIME OF ARRIVAL AT NEXT PORT
STORE SHPARV EVENT AT NEXT PORT
RELEASE BERTHING FACILITY USE BY SHIP
IS THERE A SHIP WAITING FOR FACILITY ?
NO
YES
DETERMINE NEXT SHIP ON QUEUE TO USE FACILITY UPDATE QUEUE
STORE SHPARV EVENT FOR NEXT SHIP AT THIS PORT
RETURN

```
      SUBROUTINE SHPLV                                                  SHPLV      2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    SHPLV      3
     1 ,ADJCGO(8),NTEST                                                 SHPLV      4
      COMMON /SUMY/ SUMSHP(30,10),SUMPRT(30,10) ,ISHPRT(30,6)           SHPLV      5
      COMMON                                                            SHPLV      6
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     SHPLV      7
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       SHPLV      8
     1,IGEN,PUTL                                                        SHPLV      9
     1 /CARGOG/ NCARGN,KARGEN(1000,3), CARGEN(1000)                     SHPLV     10
     2, JCARGO(1000,3),CARGO(1000),NSCGO                                SHPLV     11
     1/SHIP/ NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)      SHPLV     12
     1/PORT/NPORT(30,6),IFAC(30,10)                                     SHPLV     13
     3,IQUEUE(1000,2),NQUEUE,NSE(30,30)                                 SHPLV     14
      IDSHIP=LVENT2                                                     SHPLV     15
      IDPORT=LVENT3                                                     SHPLV     16
      IF(NPORT(IDPORT,5).EQ.1) CALL UPDTE                               SHPLV     17
      ITYPE=NSHIP(IDSHIP,1)                                             SHPLV     18
      NITN=NSHIP(IDSHIP,7)                                              SHPLV     19
      IF(NITN.GT.0) GO TO 10                                            SHPLV     20
      NXPORT=IABS(NSHIP(IDSHIP,12) )                                    SHPLV     21
       IF(NSHIP(IDSHIP,12).EQ.0) CALL NXPRT(IDSHIP,IDPORT,NXPORT)       SHPLV     22
      NSHIP(IDSHIP,12)=0                                                SHPLV     23
      IF(NXPORT.GT.0) GO TO 20                                          SHPLV     24
      NXPORT=NSHIP(IDSHIP,3)                                            SHPLV     25
       NSHIP(IDSHIP,12)=1                                               SHPLV     26
      GO TO 20                                                          SHPLV     27
   10 IREL=NSHIP(IDSHIP,11)+1                                           SHPLV     28
      IF(IREL.GT.10) IREL=1                                             SHPLV     29
      IF(ITIN(NITN,IREL).LE.0) IREL=1                                   SHPLV     30
      NXPORT=ITIN(NITN,IREL)                                            SHPLV     31
      NSHIP(IDSHIP,11)=IREL                                             SHPLV     32
   20 NSHIP(IDSHIP,2)=NXPORT*100+IDPORT                                 SHPLV     33
      NSHIP(IDSHIP,14)=0                                                SHPLV     34
      IF(NPORT(IDPORT,1).EQ.NSHIP(IDSHIP,5).AND.NPORT(NXPORT,1).EQ.     SHPLV     35
     1NSHIP(IDSHIP,4))NSHIP(IDSHIP,15) = NSHIP(IDSHIP,15)+100           SHPLV     36
      DIST=XDIST(IDPORT,NXPORT)                                         SHPLV     37
      TEVENT=TIME+(DIST/FLOAT(MTSHIP(ITYPE,14)))/24.                    SHPLV     38
      IF(IOUT.EQ.1) WRITE(6,1000)TIME,IDPORT,IDSHIP,NXPORT,TEVENT       SHPLV     39
      NSHIP(IDSHIP,6)=TEVENT*100.                                       SHPLV     40
      IF(NPORT(IDPORT,1).NE.NSHIP(IDSHIP,4)) GO TO 100                  SHPLV     41
      IF(NPORT(NXPORT,1).NE.NSHIP(IDSHIP,5)) GO TO 100                  SHPLV     42
      SUMSHP(ITYPE,1)=SUMSHP(ITYPE,1)+MTSHIP(ITYPE,11)                  SHPLV     43
      SUMSHP(ITYPE,2)=SUMSHP(ITYPE,2)+MTSHIP(ITYPE,12)                  SHPLV     44
      SUMSHP(ITYPE,3)=SUMSHP(ITYPE,3)+FLOAT(MTSHIP(ITYPE,11))*PUTL      SHPLV     45
     1-NSHIP(IDSHIP,9)                                                  SHPLV     46
      SUMSHP(ITYPE,4)=SUMSHP(ITYPE,4)+MTSHIP(ITYPE,12)                  SHPLV     47
     1 -NSHIP(IDSHIP,10)                                                SHPLV     48
  100 LVENT1=2                                                          SHPLV     49
      LVENT2=IDSHIP                                                     SHPLV     50
      LVENT3=NXPORT                                                     SHPLV     51
      CALL PUT                                                          SHPLV     52
      NSE(ITYPE,NXPORT)=NSE(ITYPE,NXPORT)+1                             SHPLV     53
      NSE(ITYPE,IDPORT)=NSE(ITYPE,IDPORT)-1                             SHPLV     54
      IF(NPORT(IDPORT,5).EQ.1) RETURN                                   SHPLV     55
      IFAC1=NSHIP(IDSHIP,13)                                            SHPLV     56
      IF(IFAC1.GT.0) IFAC(IDPORT,IFAC1)=IFAC(IDPORT,IFAC1)+1            SHPLV     57
      NSHIP(IDSHIP,13)=0                                                SHPLV     58
```

```
                  30 IF(NQUEUE.LE.0) RETURN                                          SHPLV      59
                     IF(IFAC1.LE.0) RETURN                                           SHPLV      60
                     DO 40 I=1,NQUEUE                                                SHPLV      61
                     IF(IQUEUE(I,2).NE.IDPORT) GO TO 40                              SHPLV      62
                  45 IDSHIP=IQUEUE(I,1)                                              SHPLV      63
                     ITYPE=NSHIP(IDSHIP,1)                                           SHPLV      64
                     IF(MTSHIP(ITYPE,9).NE.IFAC1.AND.MTSHIP(ITYPE,10).NE.IFAC1) GOTO 40 SHPLV   65
                     LVENT1=2                                                        SHPLV      66
                     LVENT2=IDSHIP                                                   SHPLV      67
                     LVENT3=IDPORT                                                   SHPLV      68
                     TEVENT=TIME                                                     SHPLV      69
                     CALL PUT                                                        SHPLV      70
                     NSHIP(IDSHIP,13)=IFAC1                                          SHPLV      71
                  50 IQUEUE(I,1)=0                                                   SHPLV      72
                     IQUEUE(I,2)=0                                                   SHPLV      73
                     SUMPRT(IDPORT,IFAC1+3)=SUMPRT(IDPORT,IFAC1+3)+TEVENT            SHPLV      74
                    1-FLOAT(NSHIP(IDSHIP,6))*.01                                     SHPLV      75
                     ISMPRT(IDPORT,IFAC1)=ISMPRT(IDPORT,IFAC1)+1                     SHPLV      76
                     IF(IOUT.EQ.1) WRITE(6,1002) IDSHIP                              SHPLV      77
                     RETURN                                                          SHPLV      78
                  40 CONTINUE                                                        SHPLV      79
                     RETURN                                                          SHPLV      80
                1000 FORMAT(5X,F7.3,5X,I4,5X,I4,5X,*SHIP LEAVING PORT,NEXT=*,I4,    SHPLV      81
                    1 * ETA =*,F7.3)                                                 SHPLV      82
                1002 FORMAT(35X,*NEXT SHIP =*,I4,* ENTERING FROM QUEUE*)            SHPLV      83
                     END                                                             SHPLV      84
```

SPOOL

Activity Performed: Reactivates unused ships into service.

Type: Event

Common Used: /CARGOG/, /CONTRL/, /GEN/, /PORT/, /SHIP/, /SUMY/

Called by: TAKE

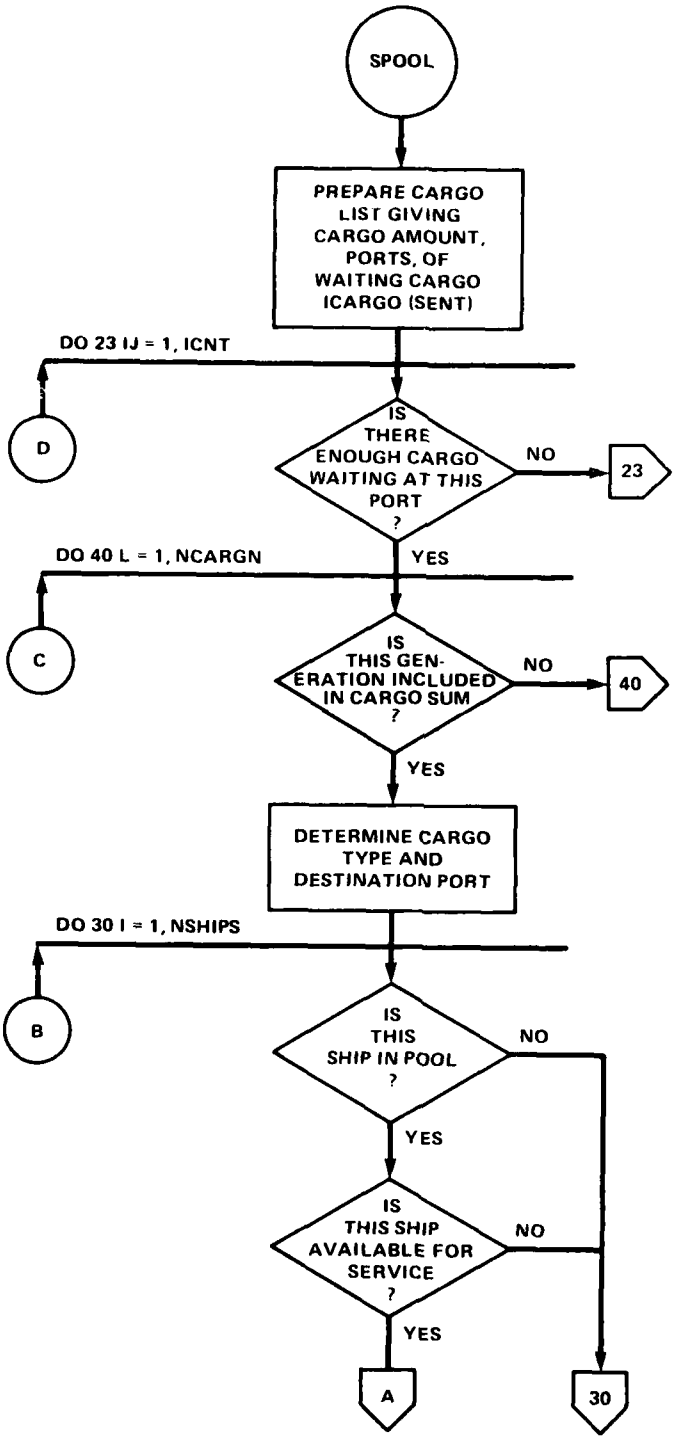
Stored by: RDPARM, SHPARV, SPOOL

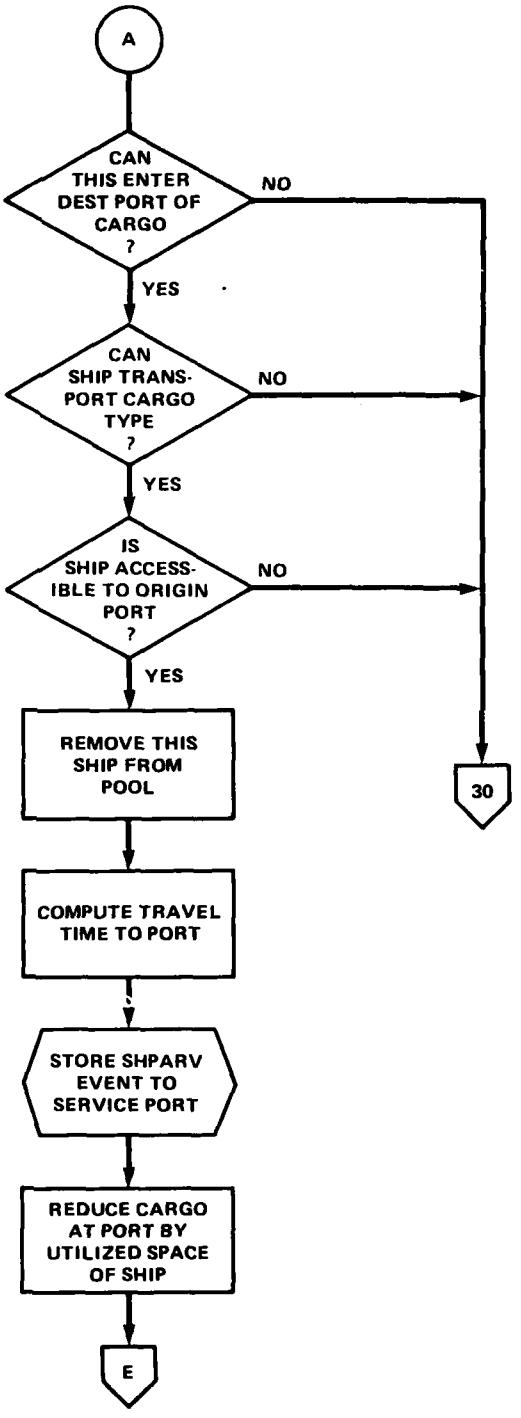
Subroutines Called: FORDER, PUT

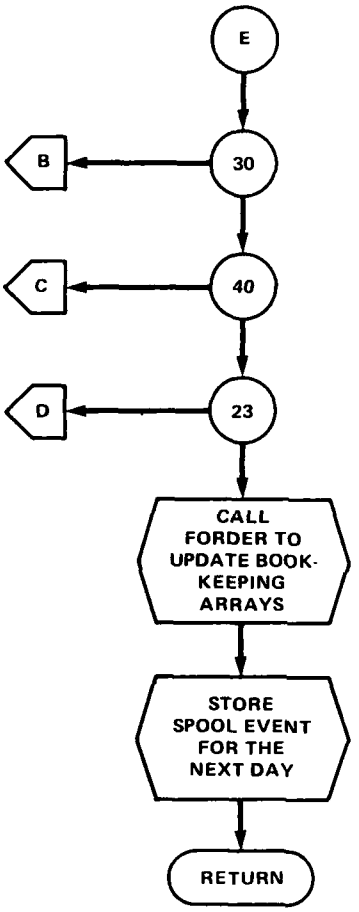
Events Stored: SPOOL, SHPARV

Description:

SPOOL activates the ships assigned to the ship pool and positions them at ports having excess cargo. After all ports with excess cargo have been determined, ships which satisfy the transfer and berthing criteria are assigned to service ports with backlogged cargo. SPOOL stores a SHPARV event for each ship scheduled to leave the ship pool.


SPOOL
PREPARE CARGO LIST GIVING CARGO AMOUNT, PORTS, OF WAITING CARGO ICARGO (SENT)
DO 23 IJ = 1, ICNT
D
IS THERE ENOUGH CARGO WAITING AT THIS PORT ?
NO
23
YES
DO 40 L = 1, NCARGN
C
IS THIS GEN-ERATION INCLUDED IN CARGO SUM ?
NO
40
YES
DETERMINE CARGO TYPE AND DESTINATION PORT
DO 30 I = 1, NSHIPS
B
IS THIS SHIP IN POOL ?
NO
YES
IS THIS SHIP AVAILABLE FOR SERVICE ?
NO
YES
A
30


A
CAN THIS ENTER DEST PORT OF CARGO ?
NO
YES
CAN SHIP TRANS-PORT CARGO TYPE ?
NO
YES
IS SHIP ACCESS-IBLE TO ORIGIN PORT ?
NO
YES
REMOVE THIS SHIP FROM POOL
COMPUTE TRAVEL TIME TO PORT
STORE SHPARV EVENT TO SERVICE PORT
REDUCE CARGO AT PORT BY UTILIZED SPACE OF SHIP
E
30


E
B
30
C
40
D
23
CALL FORDER TO UPDATE BOOK-KEEPING ARRAYS
STORE SPOOL EVENT FOR THE NEXT DAY
RETURN

```
      SUBROUTINE SPOOL                                                  SPOOL      2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    SPOOL      3
     1 ,ADJCGO(8),NTEST                                                 SPOOL      4
      COMMON /SUMY/ SUMSHP(30,10),SUMPRT(30,10) ,ISMPRT(30,6)           SPOOL      5
      COMMON                                                            SPOOL      6
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     SPOOL      7
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       SPOOL      8
     1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                       SPOOL      9
     2,JCARGO(1000,3),CARGO(1000),NSCGO,CARGC(2)                        SPOOL     10
     1/SHIP/ NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)      SPOOL     11
     1/PORT/NPORT(30,6),IFAC(30,10)                                     SPOOL     12
     3,IQUEUE(1000,2),NQUEUE,NSE(30,30)                                 SPOOL     13
      DIMENSION ICARGO(30),CGO(1000),SUM(30)                            SPOOL     14
      DO 10 I=1,NCARGN                                                  SPOOL     15
   10 CGO(I)=CARGEN(I)                                                  SPOOL     16
      ICNT=0                                                            SPOOL     17
      DO 20 I=1,NNPORT                                                  SPOOL     18
      SUM(I)=0                                                          SPOOL     19
      ICHK=SUMPRT(I,1)-SUMPRT(I,2)                                      SPOOL     20
      IF(ICHK.LE.0) GO TO 20                                            SPOOL     21
      DO 11 KK=1,NSTYP                                                  SPOOL     22
   11 SUM(I)=SUM(I)+FLOAT(MTSHIP(KK,11))*FLOAT(NSE(KK,I))               SPOOL     23
      ICHK=ICHK-SUM(I)                                                  SPOOL     24
      IF(ICHK.LT.CARGC(1)) GO TO 20                                     SPOOL     25
      SUM(I)=ICHK                                                       SPOOL     26
      ICNT=ICNT+1                                                       SPOOL     27
      ICARGO(ICNT)=ICHK*10000+I                                         SPOOL     28
   20 CONTINUE                                                          SPOOL     29
      LIM1=ICNT-1                                                       SPOOL     30
      DO 24 I=1,LIM1                                                    SPOOL     31
      LIM2=I+1                                                          SPOOL     32
      DO 25 J=LIM2,ICNT                                                 SPOOL     33
      IF(ICARGO(I).GE.ICARGO(J)) GO TO 25                               SPOOL     34
      ISAVE=ICARGO(I)                                                   SPOOL     35
      ICARGO(I)=ICARGO(J)                                               SPOOL     36
      ICARGO(J)=ISAVE                                                   SPOOL     37
   25 CONTINUE                                                          SPOOL     38
   24 CONTINUE                                                          SPOOL     39
      DO 48 MM=1,2                                                      SPOOL     40
      DO 23 II=1,ICNT                                                   SPOOL     41
      IF(ICARGO(II)/10000.LT.CARGC(1)) GO TO 23                         SPOOL     42
      IPORT=MOD(ICARGO(II),10000)                                       SPOOL     43
      DO 40 L=1,NCARGN                                                  SPOOL     44
      IF(CGO(L).LE.0) GO TO 40                                          SPOOL     45
      K=MOD(KARGEN(L,1)/10,100)                                         SPOOL     46
      IF(SUM(K).LT.CARGC(1)) GO TO 23                                   SPOOL     47
      IF(IPORT.NE.K) GO TO 40                                           SPOOL     48
      J=MOD(KARGEN(L,1)/1000,100)                                       SPOOL     49
      ICT=MOD(KARGEN(L,1),10)                                           SPOOL     50
      DO 30 I=1,NSHIPS                                                  SPOOL     51
      IF(FLOAT(NSHIP(I,[illegible])*.01.GT.TIME ) GO TO 30              SPOOL     52
      IF(NSHIP(I,12).NE.1) GO TO 30                                     SPOOL     53
      IF(MM.EQ.2) GO TO 49                                              SPOOL     54
      IF(K.NE.NSHIP(I,2)) GO TO 30                                      SPOOL     55
   49 ITYPE=NSHIP(I,1)                                                  SPOOL     56
      IF(MTSHIP(ITYPE,13).GT.NPORT(K,3)) GO TO 30                       SPOOL     57
      DO 45 NN=1,8                                                      SPOOL     58
```

```
                  IF(MTSHIP(ITYPE,NN).EQ.ICT) GO TO 50                                  SPOOL      59
                45 CONTINUE                                                             SPOOL      60
60                 GO TO 30                                                             SPOOL      61
                50 CONTINUE                                                             SPOOL      62
                   IF(MTSHIP(ITYPE,13).GT.NPORT(J,3)) GO TO 30                          SPOOL      63
                   IFAC1=MTSHIP(ITYPE,9)                                                SPOOL      64
                   IFAC2=MTSHIP(ITYPE,10)                                               SPOOL      65
65                 IF(IFAC(K,IFAC1).GT.0) GO TO 35                                      SPOOL      66
                   IF(IFAC2.LE.0) GO TO 30                                              SPOOL      67
                   IF(IFAC(K,IFAC2).LE.0) GO TO 30                                      SPOOL      68
                35 IF(NPORT(J,5).EQ.1) GO TO 36                                         SPOOL      69
                   IF(IFAC(J,IFAC1).GT.0) GO TO 36                                      SPOOL      70
70                 IF(IFAC2.LE.0) GO TO 30                                              SPOOL      71
                   IF(IFAC(J,IFAC2).LE.0) GO TO 30                                      SPOOL      72
                36 IORIG=NSHIP(I,4)                                                     SPOOL      73
                   IDELY=NSHIP(I,5)                                                     SPOOL      74
                   IF(NSHIP(I,8).LE.0) GO TO 37                                         SPOOL      75
75                 IF(NSHIP(I,8).EQ.1.AND.IORIG.NE.NPORT(K,1)) GO TO 30                 SPOOL      76
                   IF(NSHIP(I,8).EQ.2.AND.IORIG.NE.NPORT(K,1).OR                        SPOOL      77
                  1.IDELY.NE.NPORT(J,1)) GO TO 30                                       SPOOL      78
                37 DIST=0                                                               SPOOL      79
                   IF(K.EQ.NSHIP(I,2)) GO TO 47                                         SPOOL      80
80                 IDPORT=NSHIP(I,2)                                                    SPOOL      81
                   DIST=XDIST(IDPORT,K)                                                 SPOOL      82
                47 SPEED=MTSHIP(ITYPE,14)                                               SPOOL      83
                   TEVENT=FLOAT(NSHIP(I,6))*.01+(DIST/SPEED)/24.                        SPOOL      84
                   IF(TIME.GT.TEVENT) TEVENT=TIME                                       SPOOL      85
85                 IPT=NSHIP(I,2)                                                       SPOOL      86
                   IF(SUM(IPT).LT.500) GO TO 51                                         SPOOL      87
                   IF(TEVENT-TIME.GT.3.0) GO TO 30                                      SPOOL      88
                51 CGO(L)=CGO(L)-NSHIP(I,9)                                             SPOOL      89
                   NSHIP(I,4)=NPORT(K,1)                                                SPOOL      90
90                 NSHIP(I,5)=NPORT(J,1)                                                SPOOL      91
                   IF(IOUT.EQ.1) WRITE(6,1000) TIME,NSHIP(I,2),I,K,TEVENT               SPOOL      92
              1000 FORMAT(5X,F7.3,5X,I4,5X,I4,5X,*SHIP LEAVING POOL,BOUND FO PORT=*,    SPOOL      93
                  1I4,* ETA=*,F10.2)                                                    SPOOL      94
                   NSHIP(I,2)=K                                                         SPOOL      95
95                 NSHIP(I,12)=0                                                        SPOOL      96
                   NSHIP(I,14)=0                                                        SPOOL      97
                   LVENT1=2                                                             SPOOL      98
                   LVENT2=I                                                             SPOOL      99
                   LVENT3=K                                                             SPOOL     100
100                CALL PUT                                                             SPOOL     101
                   SUMSHP(ITYPE,6)=SUMSHP(ITYPE,6)+1                                    SPOOL     102
                   SUMSHP(ITYPE,5)=SUMSHP(ITYPE,5)-1                                    SPOOL     103
                   NSE(ITYPE,K)=NSE(ITYPE,K)+1                                          SPOOL     104
                   ICARGO(II)=(ICARGO(II)/10000-NSHIP(I,9))*10000+MOD(ICARGO(II)        SPOOL     105
105               1,10000)                                                              SPOOL     106
                   ISAVE=ICARGO(J)                                                      SPOOL     107
                   NSHIP(I,6)=TEVENT*100.                                               SPOOL     108
                   SUM(K)=SUM(K)-NSHIP(I,9)                                             SPOOL     109
                   IF(SUM(K).LT.CARGO(1)) GO TO 23                                      SPOOL     110
110                IF(ICARGO(II)/10000.LE.CARGO(1)) GO TO 23                            SPOOL     111
                30 CONTINUE                                                             SPOOL     112
                40 CONTINUE                                                             SPOOL     113
                23 CONTINUE                                                             SPOOL     114
                48 CONTINUE                                                             SPOOL     115
```

```
115                TEVENT=TIME+1.0                                          SPOOL    116
                   LVENT1=7                                                 SPOOL    117
                   CALL PUT                                                 SPOOL    118
                   CALL FORDER(IQUEUE,NQUEUE,2,DUM,0)                       SPOOL    119
                   CALL FORDER(JCARGO,NSCGO,3,CARGO,1)                      SPOOL    120
120                RETURN                                                   SPOOL    121
                   END                                                      SPOOL    122
```

TAKE

Activity Performed: Selects the next event to be executed with respect to the current simulation time.

Type: Subroutine

Common Used: /CONTRL/, /GEN/

Called by: Main program ROACH

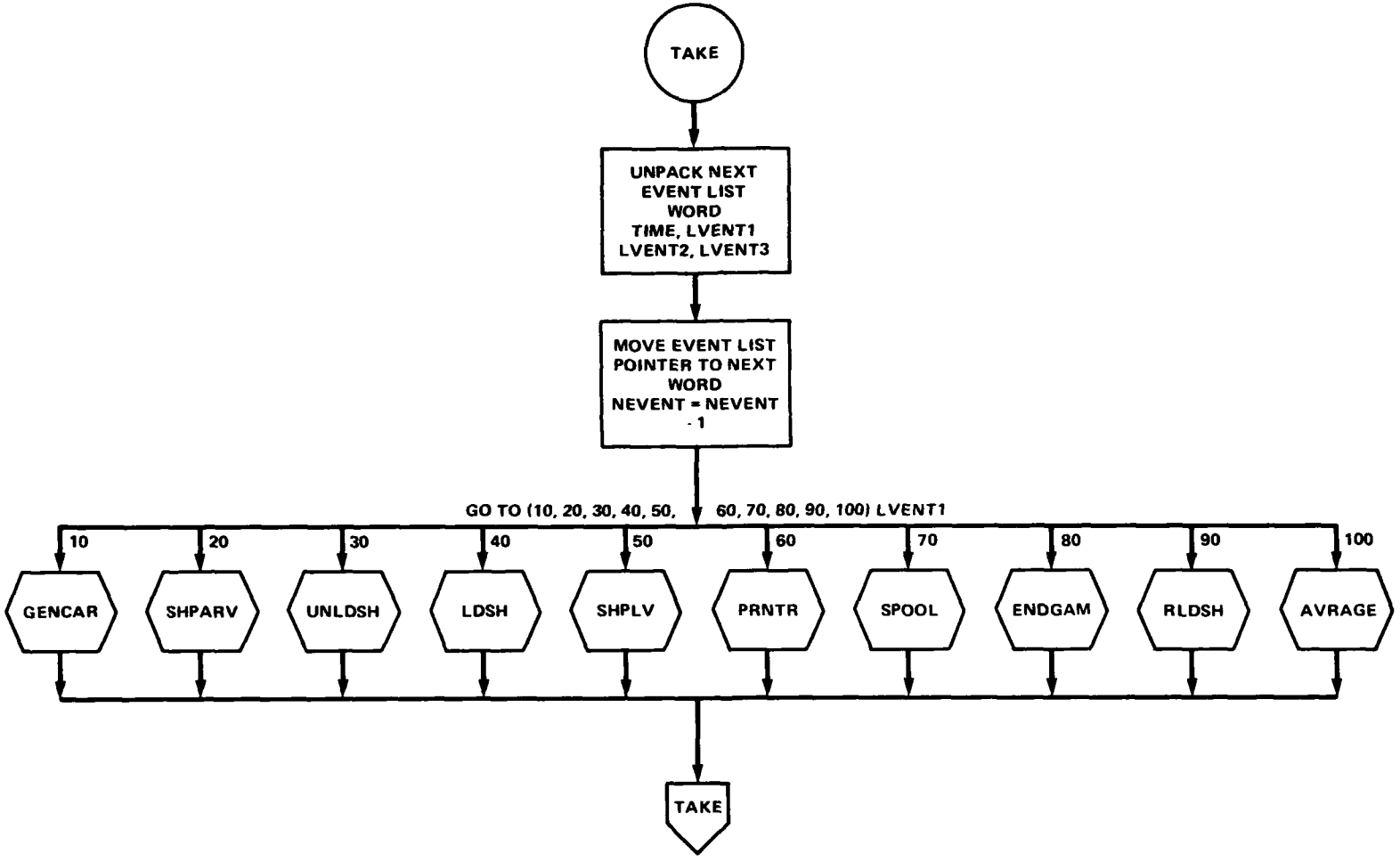
Stored by: n/a

Subroutines Called: All events

Events Stored: none

Description:

TAKE removes an event from the event list and calls it into execution.


TAKE
UNPACK NEXT EVENT LIST WORD TIME, LVENT1 LVENT2, LVENT3
MOVE EVENT LIST POINTER TO NEXT WORD NEVENT = NEVENT - 1
GO TO (10, 20, 30, 40, 50, 60, 70, 80, 90, 100) LVENT1
10
20
30
40
50
60
70
80
90
100
GENCAR
SHPARV
UNLDSH
LDSH
SHPLV
PRNTR
SPOOL
ENDGAM
RLDSH
AVRAGE
TAKE

```
      SUBROUTINE TAKE                                                   TAKE     2
C-----------------------------------------------------------------------TAKE     3
C     TAKE REMOVES THE NEXT EVENT FROM THE EVENT LIST AND CALLS IT INTO  TAKE     4
C     EXECUTION                                                         TAKE     5
C-----------------------------------------------------------------------TAKE     6
      COMMON                                                            TAKE     7
     1 /CONTRL/ DUM(1207),MTEST                                         TAKE     8
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     TAKE     9
     2 NNPORT                                                           TAKE    10
 1000 TIME=FLOAT(KEVENT(NEVENT)/100000000)*.001                         TAKE    11
      LVENT1=MOD(KEVENT(NEVENT),100)                                    TAKE    12
      LVENT2=MOD(KEVENT(NEVENT)/100,1000)                               TAKE    13
      LVENT3=MOD(KEVENT(NEVENT)/100000,1000)                            TAKE    14
      NEVENT=NEVENT-1                                                   TAKE    15
      GO TO (10,20,30,40,50,60,70,80,90,100), LVENT1                    TAKE    16
   10 CALL GENCAR                                                       TAKE    17
      GO TO 1000                                                        TAKE    18
   20 CALL SHPARV                                                       TAKE    19
      GO TO 1000                                                        TAKE    20
   30 CALL UNLOSH                                                       TAKE    21
      GO TO 1000                                                        TAKE    22
   40 CALL LOSH                                                         TAKE    23
      GO TO 1000                                                        TAKE    24
   50 CALL SHPLV                                                        TAKE    25
      GO TO 1000                                                        TAKE    26
   60 CALL PRNTR                                                        TAKE    27
      GO TO 1000                                                        TAKE    28
   70 CALL SPOOL                                                        TAKE    29
      GO TO 1000                                                        TAKE    30
   90 CALL RLDSH                                                        TAKE    31
      GO TO 1000                                                        TAKE    32
   80 CALL ENDGAM                                                       TAKE    33
      IF(MTEST.EQ.1) STOP                                               TAKE    34
      GO TO 1000                                                        TAKE    35
  100 CALL AVRAGE                                                       TAKE    36
      GO TO 1000                                                        TAKE    37
      END                                                               TAKE    38
```

UNLDSH

Activity Performed: Unloads the cargo from each incoming ship at an over-the-beach port.

Type: Event

Common Used: /CONTRL/, /A/, /GEN/, /CARGOG/, /SHIP/, /PORT/, /WATE/, /BUSH1/

Called by: TAKE

Stored by: SHPARV

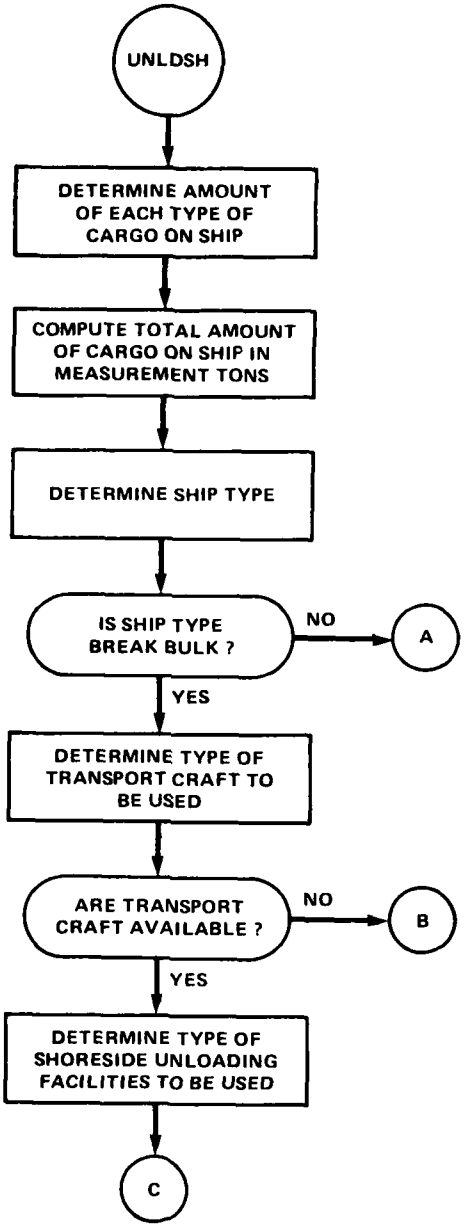
Subroutines Called: PUT

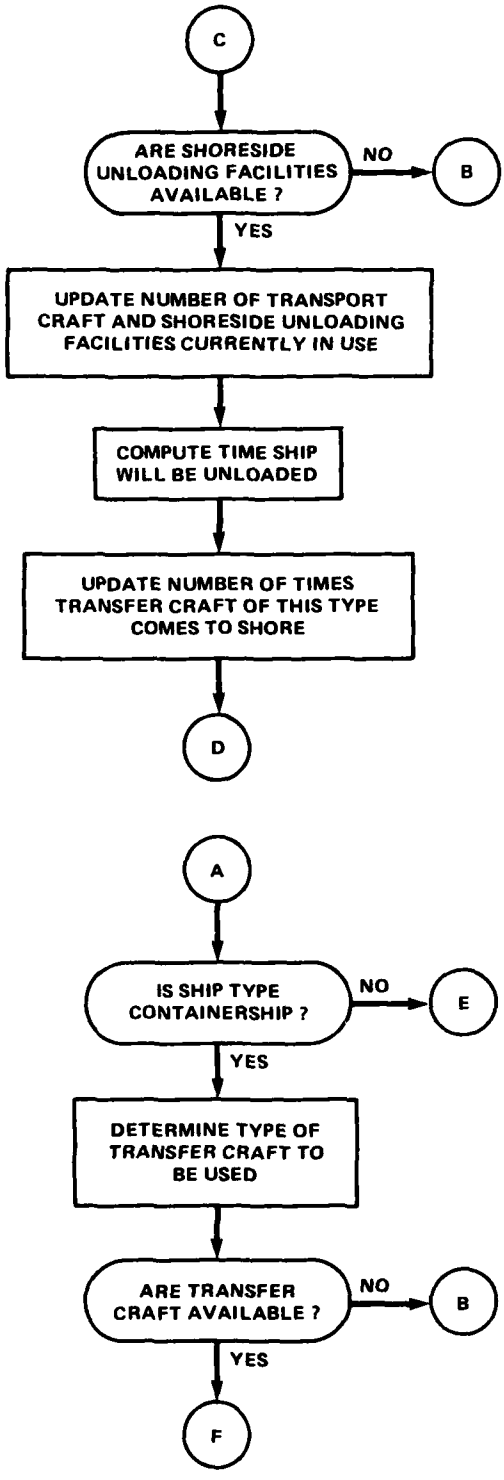
Events Stored: SHPLV

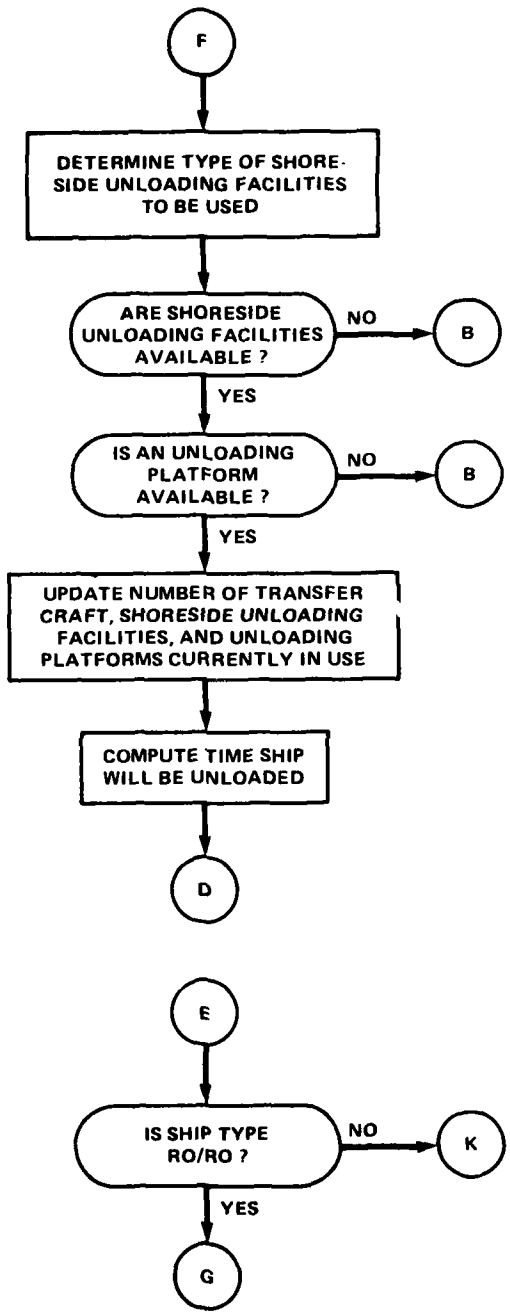
Description:

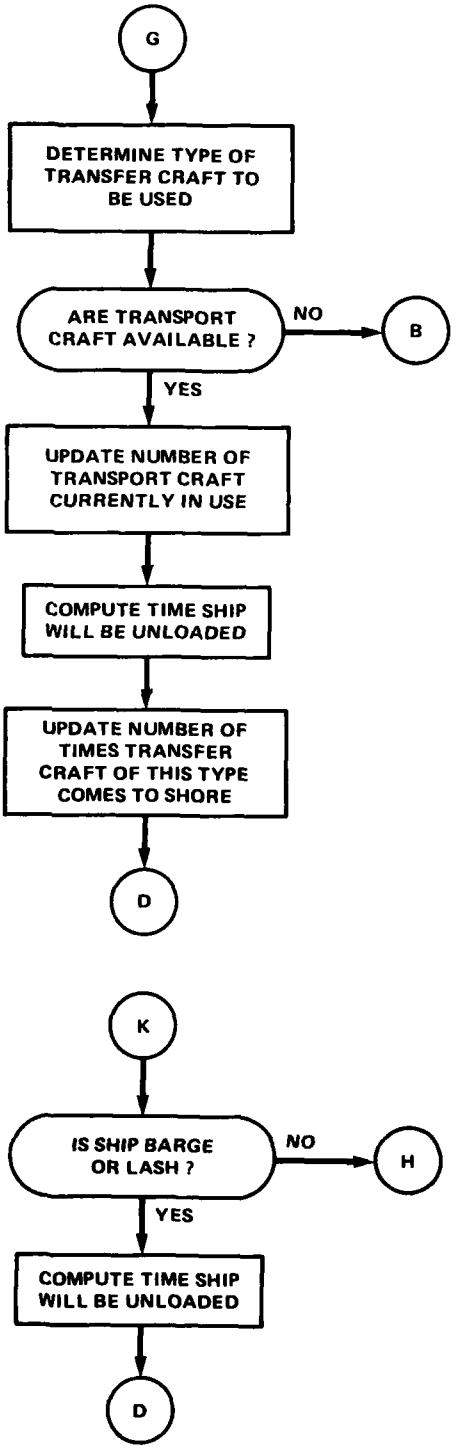
UNLDSH controls the unloading of ship cargo at the over-the-beach destination port. It checks on the availability of transport craft and unloading facilities. If facilities are available, the ship is unloaded. Otherwise, the ship is put into a queue until such time as craft and unloading facilities are available.

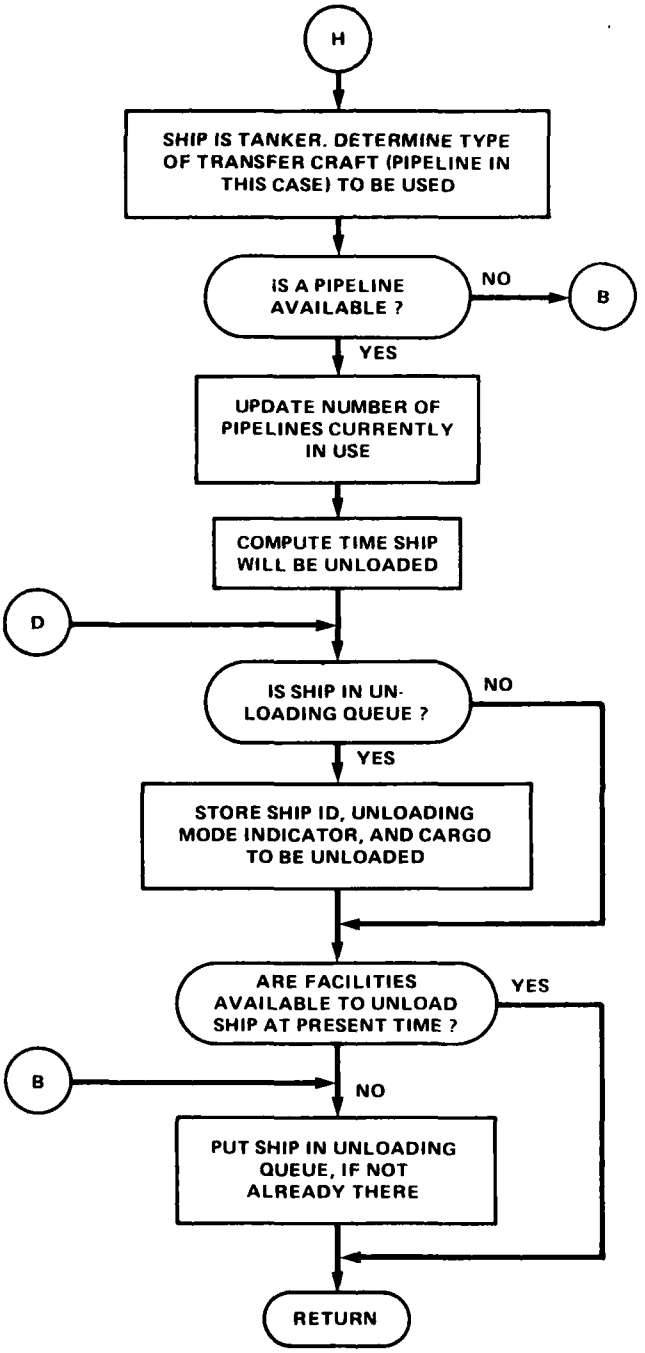
UNLDSH also updates the numbers of transport craft and unloading facilities currently in use by subtracting the number needed to unload the newly arrived ship from the number previously available.


UNLDSH
DETERMINE AMOUNT OF EACH TYPE OF CARGO ON SHIP
COMPUTE TOTAL AMOUNT OF CARGO ON SHIP IN MEASUREMENT TONS
DETERMINE SHIP TYPE
IS SHIP TYPE BREAK BULK ?
NO
A
YES
DETERMINE TYPE OF TRANSPORT CRAFT TO BE USED
ARE TRANSPORT CRAFT AVAILABLE ?
NO
B
YES
DETERMINE TYPE OF SHORESIDE UNLOADING FACILITIES TO BE USED
C


C
ARE SHORESIDE UNLOADING FACILITIES AVAILABLE ?
NO
B
YES
UPDATE NUMBER OF TRANSPORT CRAFT AND SHORESIDE UNLOADING FACILITIES CURRENTLY IN USE
COMPUTE TIME SHIP WILL BE UNLOADED
UPDATE NUMBER OF TIMES TRANSFER CRAFT OF THIS TYPE COMES TO SHORE
D
A
IS SHIP TYPE CONTAINERSHIP ?
NO
E
YES
DETERMINE TYPE OF TRANSFER CRAFT TO BE USED
ARE TRANSFER CRAFT AVAILABLE ?
NO
B
YES
F


F
DETERMINE TYPE OF SHORE-SIDE UNLOADING FACILITIES TO BE USED
ARE SHORESIDE UNLOADING FACILITIES AVAILABLE ?
NO
B
YES
IS AN UNLOADING PLATFORM AVAILABLE ?
NO
B
YES
UPDATE NUMBER OF TRANSFER CRAFT, SHORESIDE UNLOADING FACILITIES, AND UNLOADING PLATFORMS CURRENTLY IN USE
COMPUTE TIME SHIP WILL BE UNLOADED
D
E
IS SHIP TYPE RO/RO ?
NO
K
YES
G


G
DETERMINE TYPE OF TRANSFER CRAFT TO BE USED
ARE TRANSPORT CRAFT AVAILABLE ?
NO
B
YES
UPDATE NUMBER OF TRANSPORT CRAFT CURRENTLY IN USE
COMPUTE TIME SHIP WILL BE UNLOADED
UPDATE NUMBER OF TIMES TRANSFER CRAFT OF THIS TYPE COMES TO SHORE
D
K
IS SHIP BARGE OR LASH ?
NO
H
YES
COMPUTE TIME SHIP WILL BE UNLOADED
D


H
SHIP IS TANKER. DETERMINE TYPE OF TRANSFER CRAFT (PIPELINE IN THIS CASE) TO BE USED
IS A PIPELINE AVAILABLE ?
NO
B
YES
UPDATE NUMBER OF PIPELINES CURRENTLY IN USE
COMPUTE TIME SHIP WILL BE UNLOADED
D
IS SHIP IN UN-LOADING QUEUE ?
NO
YES
STORE SHIP ID, UNLOADING MODE INDICATOR, AND CARGO TO BE UNLOADED
ARE FACILITIES AVAILABLE TO UNLOAD SHIP AT PRESENT TIME ?
YES
B
NO
PUT SHIP IN UNLOADING QUEUE, IF NOT ALREADY THERE
RETURN

```
      SUBROUTINE UNLDSH                                                 UNLDSH     2
      COMMON /CONTRL/ TIMIT,SHTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)    UNLDSH     3
     1 ,ADJCGO(8),NTEST                                                 UNLDSH     4
      COMMON/A/XCARGO(9),YCARGO(40,9),IDSCGO(40,2),ZCARGO(9),TCARGO,    UNLDSH     5
     1DOFFSH,KQUEUE(50),XQUEUE(50),QTIME(5),MQUE(5)                     UNLDSH     6
      COMMON                                                            UNLDSH     7
     1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,     UNLDSH     8
     2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                       UNLDSH     9
     1/CARGO6/ NCARGN,KARGEN(1000,3),CARGEN(1000)                       UNLDSH    10
     2, JCARGO(1000,3),CARGO(1000),NSCGO                                UNLDSH    11
     1/SHIP/NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)       UNLDSH    12
     1/PORT/NPORT(30,6),IFAC(30,10)                                     UNLDSH    13
     2,IQUEUE(1000,2),NQUEUE                                            UNLDSH    14
      COMMON/WATE/ITCFT(4,2),XTCFT(4,2),ISUFAC(2,2),XSUFAC(2),IUP(2),XUP UNLDSH    15
     1,KTCFT(4),KSUFAC(2),KUP,NTCFT,NSUFAC,IUPCFT(4),IUPSUF(2),IUPUP    UNLDSH    16
     2,TNKRTE                                                           UNLDSH    17
      COMMON/BUSH1/DTME(3),UNLTC(4),TTCS(4),ATTCS(4),TUNLTC(4)          UNLDSH    18
C     DETERMINE AMOUNT OF EACH TYPE OF CARGO ON SHIP                    UNLDSH    19
      DO 620 I=1,9                                                      UNLDSH    20
  620 XCARGO(I)=0.                                                      UNLDSH    21
      DO 630 I=1,NSCGO                                                  UNLDSH    22
      IF(LVENT2.NE. JCARGO(I,1)) GO TO 630                              UNLDSH    23
      IF(LVENT3.NE.JCARGO(I,2)) GO TO 630                               UNLDSH    24
      J=JCARGO(I,3)                                                     UNLDSH    25
      XCARGO(J)=XCARGO(J)+CARGO(I)                                      UNLDSH    26
  630 CONTINUE                                                          UNLDSH    27
C     COMPUTE TOTAL AMOUNT OF CARGO ON SHIP IN MEASUREMENT TONS         UNLDSH    28
      XTCRGO=0.                                                         UNLDSH    29
      DO 640 I=1,9                                                      UNLDSH    30
  640 XTCRGO=XTCRGO+XCARGO(I)                                           UNLDSH    31
C     DETERMINE SHIP TYPE                                               UNLDSH    32
      IDSHIP=LVENT2                                                     UNLDSH    33
      ISHPTP=NSHIP(IDSHIP,1)                                            UNLDSH    34
C     CHECK SHIP TYPE                                                   UNLDSH    35
      IF(MTSHIP(ISHPTP,20).NE.1) GO TO 200                              UNLDSH    36
C     SHIP IS BREAK BULK                                                UNLDSH    37
C     DETERMINE TYPE OF TRANSPORT CRAFT TO BE USED                      UNLDSH    38
      ITTC=MTSHIP(ISHPTP,21)                                            UNLDSH    39
C     CHECK IF TRANSPORT CRAFT ARE AVAILABLE                            UNLDSH    40
      IT1=ITCFT(ITTC,1)-ITCFT(ITTC,2)                                   UNLDSH    41
      IF(MTSHIP(ISHPTP,17).LE.IT1) GO TO 100                            UNLDSH    42
      GO TO 1005                                                        UNLDSH    43
C     DETERMINE TYPE OF SHORESIDE UNLOADING FACILITIES TO BE USED       UNLDSH    44
  100 ITSUF=MTSHIP(ISHPTP,22)                                           UNLDSH    45
C     CHECK IF SHORESIDE UNLOADING FACILITIS ARE AVAILABLE              UNLDSH    46
      IT1=ISUFAC(ITSUF,1)-ISUFAC(ITSUF,2)                               UNLDSH    47
      IF(MTSHIP(ISHPTP,19).LE.IT1) GO TO 110                            UNLDSH    48
      GO TO 1005                                                        UNLDSH    49
C     UPDATE NUMBER OF TRANSPORT CRAFT AND SHORESIDE UNLOADING FACILITIE UNLDSH    50
C      CURRENTLY IN USE                                                 UNLDSH    51
  110 ITCFT(ITTC,2)=ITCFT(ITTC,2)+MTSHIP(ISHPTP,17)                     UNLDSH    52
      ISUFAC(ITSUF,2)=ISUFAC(ITSUF,2)+MTSHIP(ISHPTP,19)                 UNLDSH    53
C     COMPUTE TIME SHIP WILL BE UNLOADED                                UNLDSH    54
      X1=XTCRGO                                                         UNLDSH    55
      TEVENT=TIME+(X1/240.)/24.+(X1/XTCFT(ITTC,1))*(DTME(ITTC)/24.)     UNLDSH    56
C     UPDATE NUMBER OF TIMES TRANSFER CRAFT OF THIS TYPE COMES TO SHORE UNLDSH    57
      TTCS(ITTC)=TTCS(ITTC)+X1/XTCFT(ITTC,1)                            UNLDSH    58
```

```
                      GO TO 1000                                                UNLDSH     59
                  208 IF(MTSHIP(ISHPTP,20).NE.2) GO TO 300                      UNLDSH     60
   60             C     SHIP IS CONTAINERSHIP                                   UNLDSH     61
                  C     DETERMINE TYPE OF TRANSFER CRAFT TO BE USED             UNLDSH     62
                        ITTC=MTSHIP(ISHPTP,21)                                  UNLDSH     63
                  C     CHECK IF TRANSFER CRAFT ARE AVAILABLE                   UNLDSH     64
                        IT1=ITCFT(ITTC,1)-ITCFT(ITTC,2)                         UNLDSH     65
   65                   IF(MTSHIP(ISHPTP,17).LE.IT1) GO TO 210                  UNLDSH     66
                        GO TO 1005                                              UNLDSH     67
                  C     DETERMINE TYPE OF SHORESIDE UNLOADING FACILITIES TO BE USED UNLDSH 68
                  210 ITSUF=MTSHIP(ISHPTP,22)                                   UNLDSH     69
                  C     CHECK IF SHORESIDE UNLOADING FACILITIES ARE AVAILABLE   UNLDSH     70
   70                   IT1=ISUFAC(ITSUF,1)-ISUFAC(ITSUF,2)                     UNLDSH     71
                        IF(MTSHIP(ISHPTP,19).LE.IT1) GO TO 220                  UNLDSH     72
                        GO TO 1005                                              UNLDSH     73
                  C     CHECK IF AN UNLOADING PLATFORM IS AVAILABLE              UNLDSH     74
                  220 IT1=IUP(1)-IUP(2)                                         UNLDSH     75
   75                   IF(IT1.GE.1) GO TO 230                                  UNLDSH     76
                        GO TO 1005                                              UNLDSH     77
                  C     UPDATE NUMBER OF TRANSFER CRAFT, SHORESIDE UNLOADING FACILITIES, A UNLDSH 78
                  C      UNLOADING PLATFORMS CURRENTLY IN USE                   UNLDSH     79
                  230 ITCFT(ITTC,2)=ITCFT(ITTC,2)+MTSHIP(ISHPTP,17)             UNLDSH     80
   80                   ISUFAC(ITSUF,2)=ISUFAC(ITSUF,2)+MTSHIP(ISHPTP,19)       UNLDSH     81
                        IUP(2)=IUP(2)+1                                         UNLDSH     82
                  C     COMPUTE TIME SHIP WILL BE UNLOADED                      UNLDSH     83
                        X1=XTCRGO                                               UNLDSH     84
                        TEVENT=TIME+(X1/XUP)/24.+(X1/XTCFT(ITTC,1))*(DTME(ITTC)/24.) UNLDSH 85
   85             C     UPDATE NUMBER OF TIMES TRANSFER CRAFT OF THIS TYPE COMES TO SHORE. UNLDSH 86
                  C      TTCS(3) IS FOR CAUSEWAY FERRIES UNLOADING CONTAINERIZED CARGO. UNLDSH 87
                        TTCS(3)=TTCS(3)+X1/XTCFT(3,1)                           UNLDSH     88
                        GO TO 1000                                              UNLDSH     89
                  300 IF(MTSHIP(ISHPTP,20).NE.3) GO TO 400                      UNLDSH     90
   90             C     SHIP IS RO/RO                                           UNLDSH     91
                  C     DETERMINE TYPE OF TRANSPORT CRAFT TO BE USED            UNLDSH     92
                        ITTC=MTSHIP(ISHPTP,21)                                  UNLDSH     93
                  C     CHECK IF TRANSPORT CRAFT ARE AVAILABLE                  UNLDSH     94
                        IT1=ITCFT(ITTC,1)-ITCFT(ITTC,2)                         UNLDSH     95
   95                   IF(MTSHIP(ISHPTP,17).LE.IT1) GO TO 310                  UNLDSH     96
                        GO TO 1005                                              UNLDSH     97
                  C     UPDATE NUMBER OF TRANSPORT CRAFT CURRENTLY IN USE       UNLDSH     98
                  310 ITCFT(ITTC,2)=ITCFT(ITTC,2)+MTSHIP(ISHPTP,17)             UNLDSH     99
                  C     COMPUTE TIME SHIP WILL BE UNLOADED                      UNLDSH    100
  100                   X1=XTCRGO                                               UNLDSH    101
                        TEVENT=TIME+(X1/2718.)/24.+(X1/XTCFT(ITTC,1))*(DTME(ITTC)/24.) UNLDSH 102
                  C     UPDATE NUMBER OF TIMES TRANSFER CRAFT OF THIS TYPE COMES TO SHORE. UNLDSH 103
                  C      TTCS(4) IS FOR CAUSEWAY FERRIES UNLOADING RO/RO CARGO. UNLDSH 104
                        TTCS(4)=TTCS(4)+X1/XTCFT(3,1)                           UNLDSH    105
  105                   GO TO 1000                                              UNLDSH    106
                  400 IF(MTSHIP(ISHPTP,20).NE.4) GO TO 800                      UNLDSH    107
                  C     SHIP IS BARGE OR LIGHTER CARRIER (LASH)                 UNLDSH    108
                  C     COMPUTE TIME SHIP WILL BE UNLOADED                      UNLDSH    109
                        X1=XTCRGO                                               UNLDSH    110
  110                   TEVENT=TIME+(X1/2174.)/24.                              UNLDSH    111
                        GO TO 1040                                              UNLDSH    112
                  C     SHIP IS TANKER                                          UNLDSH    113
                  C     DETERMINE TYPE OF TRANSFER CRAFT (A PIPELINE IN THIS CASE) TO BE U UNLDSH 114
                  800 ITTC=MTSHIP(ISHPTP,21)                                    UNLDSH    115
```

```
                C     CHECK IF A PIPELINE IS AVAILABLE                                  UNLOSH   116
                      IT1=ITCFT(ITTC,1)-ITCFT(ITTC,2)                                   UNLOSH   117
                      IF(MTSHIP(ISHPTP,17).LE.IT1) GO TO 810                            UNLOSH   118
                      GO TO 1005                                                        UNLOSH   119
                C     UPDATE NUMBER OF PIPELINES CURRENTLY IN USE                       UNLOSH   120
                  810 ITCFT(ITTC,2)=ITCFT(ITTC,2)+MTSHIP(ISHPTP,17)                     UNLOSH   121
                C     COMPUTE TIME SHIP WILL BE UNLOADED                                UNLOSH   122
                      X1=XTCRGO                                                         UNLOSH   123
                      TEVENT=TIME+(X1/TNKRTE)/24.                                       UNLOSH   124
                 1000 LVENT1=5                                                          UNLOSH   125
                      CALL PUT                                                          UNLOSH   126
                C     CHECK IF SHIP IS IN UNLOADING QUEUE                               UNLOSH   127
                      DO 410 II=1,50                                                    UNLOSH   128
                      KK=II                                                             UNLOSH   129
                      IF(KQUEUE(II).EQ.IDSHIP) GO TO 420                                UNLOSH   130
                  410 CONTINUE                                                          UNLOSH   131
                      GO TO 480                                                         UNLOSH   132
                C     SHIP IS IN QUEUE                                                  UNLOSH   133
                  420 M=MTSHIP(ISHPTP,20)                                               UNLOSH   134
                      QTIME(M)=QTIME(M)+TIME-XQUEUE(KK)                                 UNLOSH   135
                      MQUE(M)=MQUE(M)+1                                                 UNLOSH   136
                      KQUEUE(KK)=0                                                      UNLOSH   137
                C     STORE SHIP ID, UNLOADING MODE INDICATOR, AND CARGO UNLOADED       UNLOSH   138
                  480 I=1                                                               UNLOSH   139
                  490 IF(IDSCGO(I,1).NE.0) GO TO 510                                    UNLOSH   140
                      IDSCGO(I,1)=IDSHIP                                                UNLOSH   141
                      IDSCGO(I,2)=0                                                     UNLOSH   142
                      IDSCGO(I,2)=0                                                     UNLOSH   143
                      DO 500 J=1,9                                                      UNLOSH   144
                  500 YCARGO(I,J)=XCARGO(J)                                             UNLOSH   145
                      RETURN                                                            UNLOSH   146
                  510 I=I+1                                                             UNLOSH   147
                      IF(I.GT.40) GO TO 520                                             UNLOSH   148
                      GO TO 490                                                         UNLOSH   149
                  520 PRINT 530                                                         UNLOSH   150
                  530 FORMAT(1H1,10X,*ERROR -- ARRAY YCARGO EXCEEDED*)                  UNLOSH   151
                      STOP                                                              UNLOSH   152
                C     SHIP CANNOT BE UNLOADED AT PRESENT TIME DUE TO UNAVAILABILITY OF P UNLOSH  153
                C      FACILITIES                                                       UNLOSH   154
                 1005 TEVENT=TIME+.05                                                   UNLOSH   155
                      CALL PUT                                                          UNLOSH   156
                C     PUT SHIP IN UNLOADING QUEUE, IF NOT ALREADY IN QUEUE              UNLOSH   157
                      DO 740 II=1,50                                                    UNLOSH   158
                      IF(KQUEUE(II).EQ.IDSHIP) RETURN                                   UNLOSH   159
                  740 CONTINUE                                                          UNLOSH   160
                      DO 750 II=1,50                                                    UNLOSH   161
                      KK=II                                                             UNLOSH   162
                      IF(KQUEUE(II).EQ.0) GO TO 770                                     UNLOSH   163
                  750 CONTINUE                                                          UNLOSH   164
                      PRINT 760                                                         UNLOSH   165
                  760 FORMAT(1H1,10X,*SIZE OF QUEUE EXCEEDED AT UNLOADING PORT*)        UNLOSH   166
                      STOP                                                              UNLOSH   167
                  770 KQUEUE(KK)=IDSHIP                                                 UNLOSH   168
                      XQUEUE(KK)=TIME                                                   UNLOSH   169
                      RETURN                                                            UNLOSH   170
                      END                                                               UNLOSH   171
```

UPDTE

Activity Performed: Keeps track of amount of cargo unloaded and updates numbers of craft and facilities currently in use.

Type: Subroutine

Common Used: /CONTRL/, /A/, /SUMY/, /GEN/, /CARGOG/, /SHIP/, /PORT/, /WATE/

Called by: SHPLV

Stored by; n/a

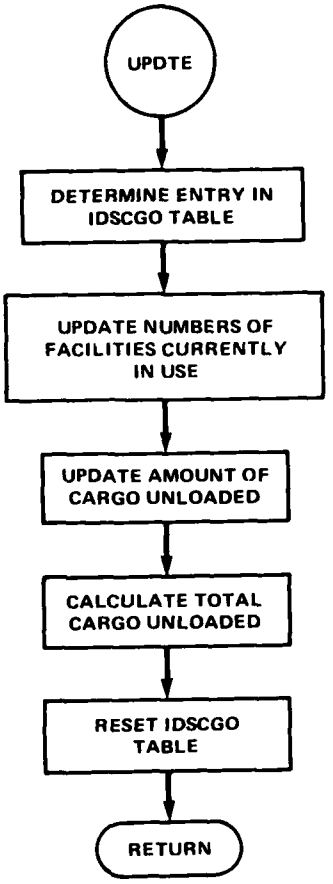
Subroutines Called: n/a

Events Stored: n/a

Description:

UPDTE updates the numbers of transport craft and unloading facilities currently in use by adding the number needed to unload the departing ship to the number previously available.

UPDTE also tabulates, in measurement tons, cargo unloaded by all ships, both by types of cargo and by total amount.


UPDTE
DETERMINE ENTRY IN IDSCGO TABLE
UPDATE NUMBERS OF FACILITIES CURRENTLY IN USE
UPDATE AMOUNT OF CARGO UNLOADED
CALCULATE TOTAL CARGO UNLOADED
RESET IDSCGO TABLE
RETURN

```
SUBROUTINE UPDTE      74/74   OPT=0 ROUND=*/ TRACE          FTN 4.8+508        07/23/81  09.54.22        PAGE     1

 1                SUBROUTINE UPDTE                                                    UPDTE      2
                  COMMON /CONTRL/ TIMIT,SMTFL,DECR(4),XDIST(30,30),PRODUC(6,6,8)      UPDTE      3
                 1 ,ADJCGO(8),NTEST                                                   UPDTE      4
                  COMMON/A/XCARGO(9),YCARGO(40,9),IDSCGO(40,2),ZCARGO(9),TCARGO,      UPDTE      5
 5               1DOFFSH,KQUEUE(50),XQUEUE(50),QTIME(5),MQUE(5)                      UPDTE      6
                  COMMON /SUMY/ DUM(30,10),SUMPRT(30,10)                              UPDTE      7
                  COMMON                                                              UPDTE      8
                 1/GEN/ TIME,TEVENT,NEVENT,KEVENT(500),RN,LVENT1,LVENT2,LVENT3,       UPDTE      9
                 2 NNPORT,NSHIPS,TINVL,IOUT,NFACT,NSTYP,NITIN                         UPDTE     10
10               1/CARGOG/ NCARGN,KARGEN(1000,3),CARGEN(1000)                        UPDTE     11
                 2, JCARGO(1000,3),CARGO(1000),NSCGO                                 UPDTE     12
                 1/SHIP/NSHIP(400,15),MTSHIP(30,22),MTSHP2(30,10),ITIN(10,10)        UPDTE     13
                 1/PORT/NPORT(30,6),IFAC(30,10)                                      UPDTE     14
                 2,IQUEUE(1000,2),NQUEUE                                             UPDTE     15
15               COMMON/WATE/ITCFT(4,2),XTCFT(4,2),ISUFAC(2,2),XSUFAC(2),IUP(2),XUP  UPDTE     16
                 1,KTCFT(4),KSUFAC(2),KUP,NTCFT,NSUFAC,IUPCFT(4),IUPSUF(2),IUPUP     UPDTE     17
                 2,TNKRTE                                                            UPDTE     18
           C     DETERMINE ENTRY IN IDSCGO TABLE                                     UPDTE     19
                 DO 10 K=1,40                                                        UPDTE     20
20               IF(LVENT2.EQ.IDSCGO(K,1)) GO TO 20                                  UPDTE     21
              10 CONTINUE                                                            UPDTE     22
              20 CONTINUE                                                            UPDTE     23
           C     UPDATE NUMBERS OF FACILITIES CURRENTLY IN USE                       UPDTE     24
                 ISHPTP=NSHIP(LVENT2,1)                                              UPDTE     25
25               ITTC=MTSHIP(ISHPTP,21)                                              UPDTE     26
                 ITSUF=MTSHIP(ISHPTP,22)                                             UPDTE     27
                 IF(MTSHIP(ISHPTP,20).NE.1) GO TO 30                                 UPDTE     28
           C     SHIP IS BREAK BULK                                                  UPDTE     29
                 ITCFT(ITTC,2)=ITCFT(ITTC,2)-MTSHIP(ISHPTP,17)                       UPDTE     30
30               ISUFAC(ITSUF,2)=ISUFAC(ITSUF,2)-MTSHIP(ISHPTP,19)                   UPDTE     31
                 GO TO 110                                                           UPDTE     32
              30 IF(MTSHIP(ISHPTP,20).NE.2) GO TO 70                                 UPDTE     33
           C     SHIP IS CONTAINERSHIP                                               UPDTE     34
                 ITCFT(ITTC,2)=ITCFT(ITTC,2)-MTSHIP(ISHPTP,17)                       UPDTE     35
35               ISUFAC(ITSUF,2)=ISUFAC(ITSUF,2)-MTSHIP(ISHPTP,19)                   UPDTE     36
                 IUP(2)=IUP(2)-1                                                     UPDTE     37
                 GO TO 110                                                           UPDTE     38
              70 IF(MTSHIP(ISHPTP,20).NE.3) GO TO 80                                 UPDTE     39
           C     SHIP IS RO/RO                                                       UPDTE     40
40               ITCFT(ITTC,2)=ITCFT(ITTC,2)-MTSHIP(ISHPTP,17)                       UPDTE     41
              80 IF(MTSHIP(ISHPTP,20).NE.5) GO TO 110                                UPDTE     42
           C     SHIP IS TANKER                                                      UPDTE     43
                 ITCFT(ITTC,2)=ITCFT(ITTC,2)-MTSHIP(ISHPTP,17)                       UPDTE     44
           C     UPDATE AMOUNT OF CARGO UNLOADED                                     UPDTE     45
45            110 DO 140 J=1,9                                                       UPDTE     46
              140 ZCARGO(J)=ZCARGO(J)+YCARGO(K,J)                                    UPDTE     47
           C     CALCULATE TOTAL CARGO UNLOADED                                      UPDTE     48
                 TCARGO=0.                                                           UPDTE     49
                 DO 150 I=1,9                                                        UPDTE     50
50            150 TCARGO=TCARGO+ZCARGO(I)                                            UPDTE     51
           C     RESET IDSCGO TABLE                                                  UPDTE     52
                 IDSCGO(K,1)=0                                                       UPDTE     53
                  DO 230 I=1,NSCGO                                                   UPDTE     54
                 IF(LVENT2.NE.JCARGO(I,1)) GO TO 230                                 UPDTE     55
55               IF(LVENT3.NE.JCARGO(I,2)) GO TO 230                                 UPDTE     56
                 ICT=JCARGO(I,3)                                                     UPDTE     57
                 JCARGO(I,1)=0                                                       UPDTE     58

                 SUMPRT(LVENT3,3)=SUMPRT(LVENT3,3)+CARGO(I)                          UPDTE     59
                 NSHIP(LVENT2,9)=NSHIP(LVENT2,9)+CARGO(I)                            UPDTE     60
60               NSHIP(LVENT2,10)=NSHIP(LVENT2,10)+(CARGO(I)/ADJCGO(ICT))            UPDTE     61
              230 CONTINUE                                                           UPDTE     62
                 RETURN                                                              UPDTE     63
                 END                                                                 UPDTE     64
```

APPENDIX

LIST OF COMMON VARIABLES

VARIABLE	COMMON	MODE = I - Input = S - Storage = * - Packed	DESCRIPTION
AA	PLT	S	Craft/facilities current status check indicator
ADJCGO(8)	CONTRL	I	Cargo type conversion factor (MT/LT)
ATTCS(4)	BUSH1	S	Average number of times each type of craft comes to shore
CARGC(2)	CARGOG	I	Cargo necessary for selection of next port (MT)
CARGEN(1000)	CARGOG	I	Cargo generation information
CARGO(1000)	CARGOG	S	Cargo in transit accumulators
DECR(4)	CONTRL	I	Number of landing craft to be decremented
DOFFSH	A	I	Distance offshore at which offloading of ships occurs
DTME(3)	BUSH1	I	Delay time to be added to cycle time for each transfer craft
IAVAL(50)	SUMY	S	Total ship volume available (MT)
IAVRGE	B	S	Internal counter for number of times subroutine AVRAGE has been called since last status summary printout
ICFT(4)	CONTRL	S	Number of each type of landing craft
IDSCGO(40,2)	A	S	Cargo to be unloaded from ships
IFAC(30,10)	PORT	I	Number of each type of facility at each port
IGEN	GEN	I	Cargo generation deck indicator
IOUT	GEN	I	Output option indicator
IPLT	PLT	S	Number of times craft and facilities usage data are output on TAPE30
IQUEUE(1000,2)	PORT	S*	Berth facility queue information
ISD(50,3)	SUMY	S	Cargo movement summary table
ISMPRT(30,6)	SUMY	S	Port facilities delay times

APPENDIX (Con't)

VARIABLE	COMMON	MODE	DESCRIPTION
ISUFAC(2,2)	WATE	S	Number of shoreside unloading facilities of type I currently for ISUFAC(I,2)
ITCFT(4,2)	WATE	S	Number of transfer craft currently in use
ITIN(10,10)	SHIP	I	Ship itineraries
IUP(2)	WATE	S	Number of unloading platforms currently in use
IUPCFT(4)	WATE	S	Number of times maximum number of transfer craft is reached
IUPSUF(2)	WATE	S	Number of times maximum shoreside unloading facilities used
IUPUP	WATE	S	Number of times upper limit of maximum unloading platforms used
JCARGO(1000,3)	CARGOG	S*	Cargo aboard ship information
KARGEN(1000,3)	CARGOG	I*	Cargo generation information
KEVENT(500)	GEN	S*	Event list
KPNCH	BUSH2	I	Option for punching build up ashore statistics
KQUEUE(50)	A	S	Table of ships waiting to be unloaded
KSUFAC(2)	WATE	S	Total number of shoreside unloading facilities
KTCFT(4)	WATE	S	Total number of transfer craft
KUP	WATE	S	Total number of unloading platforms
KY(110,7)	PLT	S	Number of transfer craft and unloading facilities currently in use
LDCRF(4)	CONTRL	S	Current number of landing craft (by type)
LVENT1	GEN	S	Event list parameter
LVENT2	GEN	S	Event list parameter
LVENT3	GEN	S	Event list parameter
MQUE(5)	A	S	Number of ships currently in unloading queue
MTEST	CONRL	S	Optimum iteration check
MTSHIP(30,22)	SHIP	I	Ship type information
MTSHP2(30,10)	SHIP	I	Ship type information
NCARGN	CARGOG	I	Number of cargo generations

APPENDIX (Con't)

VARIABLE	COMMON	MODE	DESCRIPTION
NEVENT	GEN	S	Number of event list entries
NFACT	GEN	I	Number of berthing facility types
NITIN	GEN	I	Number of ship itineraries
NMFT(5)	BUSH2	I	Names of transfer craft 1-5
NNPORT	GEN	I	Number of ports
NPORT(30,6)	PORT	I*	Port information
NQUEUE	PORT	S	Number of entries on facility queue list
NSCGO	CARGOG	S	Number of entries of cargo aboard ship
NSD	SUMY	S	Day of summary information
NSE(30,30)	PORT	S	Number of ships of each type scheduled to enter port
NSHIP(400,15)	SHIP	I	Individual ship information
NSHIPS	GEN	I	Number of ships in simulation
NSTYP	GEN	I	Number of ship types
NSUFAC	WATE	I	Number of available shoreside unloading facilities
NTCFT	WATE	I	Number of available transfer craft
NTEST	CONTRL	S	Number of iterations
PERC1(50)	SUMY	I	Fractional portion of ship's total volume to be used for cargo
PRODUC(6,6,8)	CONTRL	I	Productivity rates (MT/day)
PUTL	GEN	I	Minimum percentage of ship volume in use before ship is allowed leave port
RN	GEN	S	Random number
SHTFL	CONTRL	S	Last computed shortfall
SHTFLM	CONTRL	I	Maximum shortfall allowed
SUMPRT(30,10)	SUMY	S	Port information summary table
SUMSHP(30,10)	SUMY	S	Ship information summary table
TCARGO	A	S	Total amount of cargo unloaded
TEVENT	GEN	S	Time of event
TIME	GEN	S	Simulation time
TIMIT	CONTRL	I	Time check for (SHTFLM) shortfall
TIMSAV	CONTRL	S	Time interval between summary outputs

APPENDIX (Con't)

VARIABLE	COMMON	MODE	DESCRIPTION
TINVL	GEN	I	Summary time interval
TNKRTE	WATE	I	Tanker unloading rate (barrels/day)
TTCS(4)	BUSH1	S	Total number of times each type of transfer craft comes ashore
TUNLTC(4)	BUSH1	S	Total (aggregate) unloading time for all craft of a given type
UNLTC(4)	BUSH1	S	Unloading time for one craft of a given type
UTM(50)	SUMY	S	Ship utilization summary table
XAX(110)	PLT	S	Time of craft and facilities usage summary
XCARGO(9)	A	I	Amount of each type of cargo on ship (MT's)
XDIST(30,30)	CONTRL	I	Table of Distance between ports (nautical miles)
XQUEUE(50)	A	S	Time ship enters unloading queue
XSUFAC(2)	WATE	I	Unloading rate for shoreside unloading facility units
XTCFT(4,2)	WATE	I	Speed of transfer craft (knots)
XUP	WATE	I	Unloading rate of unloading platform (MT/day)
YCARGO(40,9)	A	S	Cargo unloaded from ships in queue
ZCARGO(9)	A	S	Amount of each type of cargo unloaded from a given ship (MT/day).

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